

COMMERCIAL FISHERIES *Review*

VOL. 29, NO. 3

DIV. OF FISHES

MARCH 1967



C

COVER: Patient pelicans poised to catch any fish that slip through
nets off coast of Valparaiso, Chile. (FAO photo by S. Larrain)

COMMERCIAL FISHERIES

Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.



Fishermen's Memorial
Gloucester, Mass.

Managing Editor: Edward Edelsberg

Production Manager
and Associate Editor: Jean Zalevsky

Production: Alma Greene (Senior Compositor)
and Mary Andrews

Contributors: J. Pileggi & G. A. Albano

The Bureau of Commercial Fisheries and
The Bureau of Sport Fisheries and Wildlife
make up The Fish and Wildlife Service of
The United States Department of the Interior.

Throughout this book, the initials BCF stand
for the Bureau of Commercial Fisheries.

Address correspondence and requests to: Commercial Fisheries Review, 1815 North
Fort Myer Drive, Room 510, Arlington, Va. 22209.

Publication of material from sources outside the Bureau is not an endorsement. The
Bureau is not responsible for the accuracy of facts, views, or opinions of these sources.

Although the contents have not been copyrighted and may be reprinted freely, reference
to source is appreciated.

Use of funds for printing this publication was approved by the Director, Bureau of the
Budget, May 1, 1963.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.
Price 60 cents (single copy). Subscription Price: \$6.50 a year; \$2 additional for foreign mailing.

W. J. Jones
8-15-69
Shontage

CONTENTS

	Page
UNITED STATES	
Events and Trends	1
States	7
Bureau of Commercial Fisheries Programs	9
Federal Actions	11
INTERNATIONAL	12
FOREIGN	
Canada	16
Latin America	18
Europe	24
Asia	29
Africa	37
ARTICLES	41
An Aircraft and Vessel Survey of Surface Tuna Schools in the Lesser Antilles, by Albert C. Jones and Paul N. Sund	
The Subtropical Underwater of the Eastern Gulf of Mexico, by Reed S. Armstrong	
Experimental Rearing of Postlarval Brown Shrimp to Marketable Size in Ponds, by Ray S. Wheeler	
INDEX	53
FDA Requirements for Fish Protein Concentrate (FPC)	57



Salmon catch on deck of floating cannery, part of Japanese deep-sea fleet. (Photo: WHO/Nichiro Gyogyo)

UNITED STATES

New England Fleet Sets Outstanding Safety Record in 1966

In 1966, New England's commercial fishing fleet of over 750 documented motor vessels established an outstanding mark in marine safety: Only 5 medium size otter trawlers were lost at sea. The 4,000 fishermen, without loss of life, landed an estimated 700 million pounds of fish and shellfish worth over \$70 million to the fishermen. This record contrasts sharply with 1964's, when 21 vessels and 6 fishermen were lost at sea, and 1965, when the fleet lost 17 vessels and 9 fishermen.

This extraordinary advance in safety may be attributed in part to the increased attention of vessel operators and crew members to safety on shipboard--as evidenced by widespread use of safety equipment and appliances. Also contributing to the record was the efficiency and skill of the First Coast Guard District's Search and Rescue Branch. In 1966, it carried out over 250 assistance missions to the fishing fleet.

Gloucester and New Bedford Lost 2 Each

The ports of Gloucester and New Bedford each lost 2 vessels from their fleet. The sole remaining casualty came from Woods Hole, Massachusetts. The Gloucester fleet lost the "F/V Raymonde" and "F/V Salvatore and Grace" when the first grounded on Cape Cod in January for a total loss and the second foundered off Gloucester in July.

The "F/V Viking," out of New Bedford, sank in Vineyard Sound in October. Her crew was rescued by another New Bedford vessel, the "F/V Matilda S".

Outward bound from New Bedford in August, the "F/V Mary and Joan" caught fire in Vineyard Sound. The vessel was spotted by the crew of a Northeast Airline plane enroute from Nantucket to Boston. The pilot sighted another fishing vessel, the "F/V Charles S. Ashley," alerted and guided it to the blazing craft, and kept circling overhead until the crew had been rescued.

New England Fishing Vessels Lost in 1965

New Bedford	Gloucester	Portland
Anastasia E. Black Hawk Conquest Glen & Maria Portugal Ruth & Nancy Susie O. Carver The Schalls	Eva II Josephine & Margaret Nancy & Maria	Anna C. Mary Anne Snoopy
	Boston	Chatham
	Magellan Olympia	Doris B.

The small otter trawler "F/V Little Chief" out of Woods Hole, storm battered and leaking badly, foundered in Vineyard Sound while under Coast Guard escort to shelter. The two-man crew of the dragger was rescued.



Oil Is Another Worry for New England Fishermen

Add oil to the harsh sea and the strong competition from Soviet trawlers as a major problem facing the New England fishermen. The newest problem results from the belief of several U. S. firms that the rich fishing grounds on Georges Bank, off Massachusetts' rocky coast, can be developed into a big oil and gas producing field.

Some fishermen see in the future giant drilling rigs blocking their tows, polluted fishing grounds, and pipelines on the bottom endangering expensive bottom fishing gear.

Several representatives of the fishing industry met recently in Boston with a leading oil wildcatter to talk about the fishermen's fears. The major fears and the wildcatter's attempts to allay them follow:

- Fishermen: The fishing industry strongly opposes any further use of high explosives on the fishing grounds for seismic readings. (Last September's blasts were blamed for killing many fish.)

- Oilman: "Now we can do it electronically. We can do it without killing fish."

- Fishermen: In the future, the density of oil and gas rigs on the grounds might be hazardous to draggers' trawls.

Oilman: "We could agree to locate rigs no closer than 4 miles apart."

● **Fishermen:** A special chemical mud used as a drilling lubricant might spill over and pollute the water.

Oilman: The mud would be recycled and never be stored in the open. This was done in the Gulf of Mexico.

● **Fishermen:** A pipeline to the mainland would be hazardous to bottom trawlers.

Oilman: "We would be perfectly willing to have them draw up laws calling for a 6- to 8-foot through for our lines." ("The New York Times," Feb. 26, 1967.)



Industry Plans to Develop Unused Gulf Fish

A Fort Myers, Fla., vessel operator plans to convert one large shrimp vessel to a single-boat purse seiner for thread herring fishing in the eastern Gulf of Mexico. His objective is to furnish raw material to a reduction plant now being built in Boca Grande, Fla.

BCF's Pascagoula, Miss., staff provided technical assistance. The Bureau plans to increase its efforts this year to develop effective harvesting techniques for thread herring and other sardine-like fishes in the Gulf. These fishes are only partially used now but show great potential.



Menhaden Industry Tests Gulf's Bottomfish Potential

A small New Jersey menhaden vessel, converted to a side trawler, has moved to Pascagoula, Miss., to fish the northern Gulf of Mexico for industrial bottomfish. It will fish for 12 months to evaluate the commercial potential of these resources as raw material for fish meal.

The annual production from this area, about 50,000 tons, is used primarily for pet food. The industry was developed partly from information produced by BCF explorations.



Fish Meal Futures Trading Begins on N.Y. Produce Exchange

The New York Produce Exchange opened a market for trading futures contracts in fish meal on March 1. Fish meal is a high-protein, mixed-feed supplement used in broiler and other poultry feed rations.

The Produce Exchange action followed studies begun a year ago with many companies in the fish meal trade in the U. S. and abroad.

What Contract Provides

The futures contract provides for delivery of 100 metric tons of Peruvian or Chilean fish meal to Hamburg, Germany. Cost, insurance, and freight will be paid by the seller and delivered at destination. The meal, to be shipped in standard paper bags, will have the following specifications: 65 percent protein, 10 percent fat, and 10 percent moisture; allowances will be made for slight variations within contract specifications. The market will have 17 trading months into the future, but dealings are to be confined to about 6 active months.

Brochures detailing terms and conditions of the C.I.F. Hamburg Fish Meal Contract can be obtained from Secretary, New York Produce Exchange, 2 Broadway, New York, N. Y. 10004 (Tel. 212-269-3400).



Fishing Vessels Are Required to Use Proper Sound-Producers

Commercial fishing vessels must be equipped with the same type of sound-producing devices used by other motorboats, as the result of amended Federal motorboat regulations that became effective January 1, 1967, reports the U. S. Coast Guard's Boating Safety Branch. Prior to the January 1 amendment, commercial fishermen were permitted to equip motorboats, regardless of class, with any sound-producing device. Now, all recreational and commercial motorboats, except those in certain motorboat races, must carry the proper sound-producers for their particular class.

Class A motorboats are less than 16 feet long. Although not required to have a specific sound-producing device, they must be able to sound the proper signals required by Rules of the Road. The devices required for any other class of motorboat may be used on Class A motorboats.

The Whistles

Motorboats that are at least 16 feet but less than 26 feet long, Class 1, must have a mouth, hand or power-operated whistle. The whistle must produce a blast for 2 or more seconds audible for at least one-half mile.

The whistle for Class 2 motorboats, 26 feet but less than 40 feet long, can be either hand or power operated, but must produce a blast for 2 or more seconds and be audible for at least 1 mile.

The largest class of motorboats, Class 3--boats at least 40 feet but not more than 65 feet long--must be equipped with a power-operated whistle audible for at least 1 mile.



First U. S. Fisheries Exposition Aims to Aid Industry

The first fisheries exposition of its kind in the U. S. will be held in Boston, October 7-14, 1967, in the exhibition area of Suffolk Downs. It will be sponsored by The American Commercial Fish Exposition, Inc., a new firm organized to aid fishing industry--to make fishermen more productive and the industry more profitable.

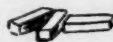
Seminars and work sessions are being arranged to evaluate problems of detection, catching, marketing, and preparation of fish in relation to basic industry research. Displays of modern fishing equipment from manufacturers around the world will be presented.

To give the display appeal outside the industry, New England's famous seafood restaurants, their chefs, and food processors will be invited to participate.



1966 Imports of Frozen Fish Blocks Declined 3%

U. S. imports of frozen fish blocks in 1966 totaled 206.6 million pounds, down 3.8 percent from the 1965 imports of 214.8 million. Cod accounted for 132 million pounds. Principal shippers were Canada with 47 percent of the total, Iceland 18 percent, Norway 6 percent, and Poland 4.7 percent.



Menhaden Catch Dropped in 1966

The U. S. menhaden catch in 1966 dropped sharply from the 1965 figures in 3 of 4 regions:

States	1966	1965
	(Millions of Pounds)	
Middle Atlantic	17.4	130.2
Chesapeake	266.6	307.9
South Atlantic	211.8	190.5
Gulf Coast	793.6	1,022.4
Total	1,289.4	1,651.0



Pacific Coast Canned Salmon Stocks Are About A Third Above 1966

On January 1, 1967, canners' stocks (sold and unsold) in the United States of Pacific canned salmon totaled 2,991,352 standard cases (48 1-lb. cans)--731,477 cases more than the 2,259,875 standard cases, January 1, 1966.

Of total stocks of 3,982,968 actual cases (cans of $\frac{1}{4}$ -lb., $\frac{1}{2}$ -lb., 1-lb., etc.), red salmon accounted for 1,967,208 cases (808,236 cases were 1-lb. cans, and 774,911 cases were $\frac{1}{2}$ -lb. cans) or 49.4 percent of the total canners' stocks on January 1, 1967; pink salmon was 1,427,496 cases or 35.8 percent (1,060,141 cases were 1-lb. talls). Next came chum (284,646 cases, mostly 1-lb. talls), followed by coho or silver (199,808 cases), and king salmon (103,810 cases). (Division of Statistics and Economics, National Canners Association, Feb. 6, 1967.)



Shrimp Imports Rose 10% in 1966

U. S. imports of all shrimp (fresh, frozen, canned, and dried) in 1966 were 178.5 million pounds--compared to 162.9 million pounds in 1965--an increase of 9.6 percent. Imports from Mexico in 1966 totaled about 68.7 million pounds--compared to 59.9 million pounds in 1965--up 14.6 percent.

In December 1966, shrimp imports (fresh, frozen, canned, and dried) were 17.7 million pounds--compared to 15.2 million pounds in December 1965. Fresh or frozen heads-off shrimp (shells-on) amounted to about 13 million pounds; peeled and deveined, about 3.5 million pounds; frozen breaded (raw or cooked) 86,258 pounds; and other types^{1/} of shrimp products (some dried and canned) about 1.2 million pounds.

Mexico shipped about 8 million pounds during December 1966, compared to 6.1 million pounds in December 1965; about 6.3 million pounds of fresh or frozen heads-off

shrimp (shells-on); peeled and deveined, 1.5 million pounds; frozen breaded (raw or cooked) 86,258 pounds; dried, 1,850 pounds; and other types of shrimp products, 61,626 pounds. ^{1/}Imports of "other types" of shrimp consisted of peeled in airtight containers or canned (145,622 pounds); cooked but not breaded (68,250 pounds); dried (59,138 pounds); and others not specified (892,903 pounds).



January 1967 Wholesale Prices and Indexes for Edibles

Seasonally light supplies of fresh fish and shellfish at higher prices resulted in a 3-percent rise from December 1966 to January 1967 in the wholesale price index for edible fishery products (fresh, frozen, and canned). At 129.1 percent of the 1957-59 average, the overall index was 3.7 percent higher than January 1966.

The subgroup index for drawn, dressed, or whole finfish rose 10 percent from Decem-

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, January 1967 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ (\$)		Indexes (1957-59=100)			
			Jan. 1967	Dec. 1966	Jan. 1967	Dec. 1966	Nov. 1966	Jan. 1966
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					129.1	125.3	125.0	124.5
Fresh & Frozen Fishery Products:					133.2	126.7	126.5	127.7
Drawn, Dressed, or Whole Finfish:					136.1	123.7	121.0	138.3
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.22	.15	172.3	117.1	115.2	187.4
Hallibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.48	.48	142.0	142.0	142.0	141.0
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	2/88	.88	2/122.2	122.2	120.2	122.3
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.75	.71	111.2	105.2	99.3	93.3
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.70	.69	114.6	112.9	106.4	122.8
Processed, Fresh (Fish & Shellfish):					133.9	125.7	127.6	128.3
Filletts, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.53	.40	127.6	97.2	114.2	105.7
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	1.14	1.07	133.6	125.4	120.1	116.0
Oysters, shucked, standards	Norfolk	gal.	8.00	7.75	134.9	130.7	139.1	147.6
Processed, Frozen (Fish & Shellfish):					124.2	124.9	125.1	111.9
Filletts: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.45	.45	114.0	114.0	110.2	101.4
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.38	.39	111.4	114.3	117.3	115.8
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.30	.31	103.5	108.7	103.5	112.2
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	1.11	1.11	131.6	131.0	131.0	110.3
Canned Fishery Products:					122.5	3/122.5	122.9	119.3
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	27.00	27.00	117.7	3/117.7	119.9	122.0
Tuna, lt. meat, chunk, No. 1 1/2 tuna (8-1 1/2 oz.), 48 cans/cs.	Los Angeles	cs.	13.08	13.08	116.1	116.1	115.0	111.0
Meckereel, jack, Calif., No. 1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	8.50	8.50	144.1	144.1	144.1	120.9
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	11.25	11.25	144.3	144.3	144.3	131.5

^{1/}Represent average prices for one day (Monday or Tuesday) during week in which 15th of month occurs. Prices are published as indicators of movement, not necessarily absolute level. See daily Market News Service "Fishery Products Reports" for actual prices.

Source: U. S. Department of Labor, Bureau of Labor Statistics.

ber to January because of substantially higher prices for nearly all items. At Boston, prices for exvessel large haddock were sharply higher (up 47.1 percent) as a result of very light landings. Prices were up for Lake Superior fresh whitefish at Chicago by 5.7 percent, and for Great Lakes round yellow pike at New York City by 1.5 percent. Although January 1967 prices were considerably higher than January 1966 for whitefish (up 19.2 percent) and slightly higher for frozen western halibut (up 0.7 percent), these were offset by lower prices for haddock (down 8.1 percent). The latter were solely responsible for a 1.6-percent subgroup index decline from January 1966.

Sharply higher prices in January 1967 for fresh haddock fillets, up 31.3 percent from December 1966, were largely responsible for a 6.5 percent rise in the subgroup index for fresh processed fish and shellfish. Haddock landings were light and the supply available for filleting small. Prices at New York City for South Atlantic fresh shrimp rose 6.5 percent from December 1966 to January 1967, and standard shucked oysters at Norfolk were up 3.2 percent. Compared with January 1966, the subgroup index in January 1967 was 4.4 percent higher. Prices rose 20.7 percent for haddock fillets and 15.2 percent for shrimp. January 1967 prices for standard shucked oysters were down 8.6 percent from January 1966.

The subgroup index for frozen processed fish and shellfish dropped 0.6 percent from December 1966 to January 1967. An upward trend in prices at Chicago for frozen shrimp was more than offset by lower prices at Boston for frozen ocean perch (down 4.8 percent) and haddock fillets (down 2.5 percent). Compared with January 1966, the subgroup index in January 1967 rose 11 percent because of much higher prices for shrimp (up 19.3 percent) and flounder fillets (up 12.4 percent). But January 1967 prices were lower for ocean perch (down 7.8 percent) and haddock fillets (down 3.8 percent) than in January 1966.

Prices for all canned fishery products listed in the index were unchanged from December to January. Market conditions appeared relatively steady. There were good supplies of some canned fish items for Lenten demand. Canned salmon is especially plentiful. But compared with January 1966, the index this January was up 2.7 percent. Prices were lower than in January 1966 for canned pink salmon but sharply higher for

California jack mackerel (up 19.2 percent) and canned Maine sardines (up 9.7 percent). (BCF Fishery Market News.)



Oceanography

"ALUMINAUT" CONDUCTS UNDERSEA SURVEYS OFF FLORIDA

Experimental dives by the deep-sea research submarine "Aluminaut" off Florida in January show the capability of such craft to perform undersea oceanographic surveys effectively, reports the U. S. Naval Oceanographic Office. The Aluminaut is owned by Reynolds Submarine Services. Five dives were performed, each 10 hours long, to 1,000 feet. Scientists from the Naval Electronics Laboratory and Lamont Geological Observatory conducted experiments on sediments and currents at the bottom.

The first dive was made to reconnoiter a selected area off the Florida coast. The second was made to the bottom at 1,000 feet. While cruising for 6 hours at 10 feet off the bottom, a photographic and visual reconnaissance was conducted up slope to 100 feet. Visibility was excellent in deep water, limited only by the artificial lights used, but dropped to about 25 feet near shore. The Aluminaut, which has wheels, actually rode along the bottom during much of this dive.

During the third, the vessel rested on the bottom. Steel balls of known weight and diameter were dropped at given distances to the bottom, clouding the waters near the ocean's floor. The amount of visibility obstructed by the disturbance of the ocean bottom is an important problem facing the Navy in its program for rescuing sailors from sunken subs using rescue vehicles. Current studies with dye markers were used to investigate ocean dynamics. Dive four investigated the maximum visual and acoustic ranges to a variety of bottom markers. The last dive evaluated the vessel's characteristics while operating at depth.

NAVY STUDIES WAYS OF RECOVERING TESTING DEVICES

As part of a program to avoid loss of valuable underwater testing devices, the U. S.

Naval Oceanographic Office recently conducted tests adjacent to the Bahama Islands.

From the research vessel "USS Little-hales," engineers from the Instrumentation Center experimented with recovery methods for several costly devices used in oceanographic work. The first was a flotation system to recover an acoustic transducer usually towed behind a ship at depth of about 100 feet. (This distance is necessary to avoid interference from normal ship's noises.)

Costing nearly \$30,000 each, these sonar devices are packaged in a streamlined 9-foot "fish." The recovery apparatus is 2 rubber flotation bags released automatically when the towing gear parts. To aid in recovery, a signal light flashes on and a pinger is actuated. An existing requirement is that all recovery systems function instantly to prevent the 2,000 pound instrumentation housing from plummeting to depths near 500 feet. At such pressures, outside forces would prevent inflation of the recovery bags.

Test Gas That Helped Recover H-Bomb

The Navy also tested a "Monopropellant Gas Generator" designed to inflate the flotation bags under great pressures. Hydrazine gas, used to help recover the H-bomb lost off the shores of Palomares, Spain, was used. This generator would be effective to depths of 20,000 feet.

An expendable bathythermograph (BT) was tested to see if a body in free fall in ocean waters falls at a constant rate. An expendable BT is an electronic instrument of about 1½ pounds that allows a temperature profile to be made at speeds up to 30 knots in any sea state. Other special use BTs were tested.

Also tested was a Precision Fathometer Recorder, an electronic device designed to provide the oceanographer with a bottom profile.

ROUND-THE-WORLD MAGNETIC SURVEY FLIGHT UNDERWAY

The U. S. Naval Oceanographic Office is conducting an airborne geomagnetic survey of all accessible ocean areas of the world. It is called "Project Magnet." Geomagnetic data are used to prepare navigational and world isomagnetic charts, which provide more re-

liable navigational data to ships and aircraft of all nations.

A new round-the-world flight began in February and will involve about 14 countries in 40 days. Information gathered will be distributed to all nations through the International World Data Center.

NAVIGATIONAL FIELD SURVEY OF PACIFIC COAST AND HAWAII SCHEDULED

The Coast and Geodetic Survey (CGS) has announced that a field inspection will be made this year of navigational facilities and conditions on the coasts of California, Oregon, Washington, and Hawaii.

The findings will be incorporated in a new edition of U. S. Coast Pilot 7, one of a series of nautical books that supplies information important to navigators of U. S. coastal and intracoastal waters. Generally, the books furnish in narrative form information that cannot be shown graphically on marine charts--navigation regulations, weather, ice, freshets, routes, and port facilities.

CGS will consult with Federal agencies, port authorities, pilots, and other marine interests. Similar information about the Hawaiian Islands will be obtained during an 8-week inspection tour later this year.

A new edition of each Coast Pilot is published at intervals of 4 to 10 years. Yearly supplements bring information up to date. The information is considered vital for safe navigation, and Coast Pilots are consulted regularly by skippers of naval and commercial craft and small boat operators.

Coastal areas covered by Coast Pilot 7 will include: San Diego to Point Arguello, Calif.; Channel Islands, Calif.; Point Aruello to San Francisco Bay; San Francisco Bay; San Francisco Bay to Point St. George, Calif.; Chetco River to Columbia River, Ore.; Columbia River, Oregon and Washington; Columbia River to Strait of Juan de Fuca, Wash.; Straits of Juan de Fuca and Georgia, Wash.; Puget Sound, Wash.; and Hawaii.



STATES

Alaska

GOVERNOR URGES FISHING GEAR LIMITS

Governor Walter J. Hickel of Alaska has called for the limitation of gear in the salmon and king crab fishing industries. In a message to the Association of Pacific Fisheries, Hickel said the trend toward more and more gear, if not reversed, ultimately will damage both fisheries.

He emphasized: "From 1960 to 1966 there has been an increase of about 100 percent in the number of vessels and gill nets and almost 300 percent in the number of set nets in Bristol Bay. This increase came in the face of an outlook for poor runs in 1962, 1963, and 1964. This trend must be arrested and reversed, otherwise the fish harvest will be an economic farce, even if the runs are strong."

Hickel said the buildup of the king crab industry in the Kodiak area shows that the fishery is at or near the level of maximum sustainable yield. Any further increase in harvesting capacity could have serious repercussions, including curtailment of fishing time and a drop in efficiency.

KING CRAB LANDINGS IN 1966 SET RECORD

Alaska king crab landings totaled 159 million pounds in 1966--an increase of 27 million pounds, or 21 percent, over 1965's 132 million pounds. The value of the 1966 catch to the fishermen was about \$16 million.



Michigan

SEEKS TO BALANCE FISHING DEMANDS WITH LIMITED STOCKS

The Conservation Commission has endorsed in principle a plan to regulate commercial fishing in Michigan's Great Lakes waters by presetting harvest areas and quotas and, when and where necessary, issuing individual fishing permits.

The new approach to balancing commercial fishing demands with limited fish stocks, particularly high-value species, departs markedly from the present system of licensing that allows unlimited entry into the sagging Great Lakes industry.

Fisheries officials stress that the proposed new control system is absolutely necessary to help put the industry back on its feet. The plan, which requires enabling legislation, would be tested first on the lake trout fishery of Lake Superior. When enough experience is gained there, the program could be refined and extended to other species of fish and other areas of the Great Lakes.

To guide the fishery in the best interests of all, the Conservation Department will encourage the establishment of advisory committees representing commercial operators, sport fishermen, and the general public.

Some Fishermen Object

To meet some objections, the Department changed that part of its proposed plan that would have regulated most commercial fishing under contracts awarded through competitive bidding. Commercial fishing interests argued that it would force too many out of business and discriminate in favor of big operators who would have a decisive edge in making top bids for contracts.

The Department conceded that its plan would restrict participation in the commercial fishing industry. But, it pointed out, operators issued permits would stand a much better chance of making good returns for their efforts than is true now. Under the present setup of wide-open entry in the industry, there are too many fishermen for the supplies of quality fish stocks.

BUILDS VESSEL FOR GREAT LAKES RESEARCH

The State of Michigan's Conservation Department is building a vessel to carry out intensive fisheries studies in the Great Lakes.

The 60-foot steel craft, under construction at Escanaba, Mich., will be powered by

Michigan (Contd.):

twin diesel engines and rigged with the latest fish-finding and navigational equipment, including hydraulically operated netting gear, radar, and sonar. It will be manned by the Conservation Department to give its fisheries biologists accurate, up-to-date information on Great Lakes fish stocks needed to manage sport and commercial fishing for top allowable returns.

The vessel's research work first will emphasize salmon and trout populations in Lake Superior and Michigan. The vessel's home port has not been selected yet, but plans call for it to be in northern Lake Michigan. (Michigan Department of Conservation, Feb. 2, 1967.)



Mississippi

CATFISH PRODUCTION INCREASES

There are 4,500 acres of farm ponds under catfish production in southeast Mississippi. Within 2 years, 12,000 more acres will be completed. Near Yazoo City, one company is building 1,600 acres of catfish ponds, processing plant, fish meal plant, and feed mill. The capital investment is over \$4 million. Production is expected to begin within 18 months. BCF is providing technical assistance in harvesting techniques.



Texas

SHRIMP THREATENED BY DESTRUCTION OF ESTUARIES

A report of the Texas Parks and Wildlife Department to the Governor and legislature paints a discouraging picture of the shrimp fishery's future. The report states that "the

continuation of the present trend toward bulkheaded shorelines would result in diminishing shrimp production."

Here are some excerpts: "The life of the shrimp is short, and the period spent in the bays is only two or three months in duration for each successive overlapping swarm. There may be five or six such swarms during the warmer months. This brief but vital period in the bay nursery areas has become the weakest link in the life cycle of the shrimp. It is on this weak link that the future of the shrimp industry must depend.

"The crisis that has arisen is the accelerated disturbance and destruction of the estuarine nursery areas along the Texas coast. While such submerged land areas are public lands belonging to the State of Texas, they are unprotected by state regulation and are open to any and all types of man-made modification. . . .

"Rapid development of the coastal region in both industrial and residential expansion has brought piecemeal channel dredging, filling and spoiling throughout the bay systems without overall design or plan. The combined effect of such modification is great."

The report cites a recent BCF study in the Galveston Bay area comparing shrimp production along two similar shorelines--but one had been modified by construction of a dredge-fill bulkhead. Intensive sampling for 10 months produced 2.5 times more brown shrimp and 14 times more white shrimp along the natural shore than along the bulkheaded shore.

The report makes clear what is at stake: "The shrimp fishery is this nation's most valuable commercial fishery, and that of Texas is today the largest of any state. Dockside value to the fisherman amounts to about \$35,000,000 per year."



BUREAU OF COMMERCIAL FISHERIES PROGRAMS

Invertebrates in New England Marine Waters May Have Value

A summary of benthic (sea bottom) fauna data from an Atlantic Continental Shelf and Slope study by BCF's Biological Laboratory at Woods Hole, Mass., shows interesting relationships between the density of different groups of animals and the type of bottom sediments they inhabit.

Sea scallops (*Placopecten*) and lobsters (*Homarus*) are the only benthic invertebrates now being fished in offshore waters. It may become economically worthwhile in the future to use other benthic species for human food, animal food, fertilizer, etc. The large standing crop of invertebrates in New England marine waters grows rapidly--and so may have a useful potential.



Seattle Lab Studies Gray Whales

The BCF Marine Mammal Biological Laboratory in Seattle, Wash., was authorized to take 40 (later increased to 60) gray whales in 1966 to obtain data on the reproductive cycle and other biologic features of the gray whale. The data are essential to any further use of the species. The 1967 quota is 100 whales.



BCF's "Undaunted" Cooperates in Fishery Research

For several years BCF's "Undaunted," "Geronimo," and "Oregon" cooperated with the UN Caribbean Fishery Development Project by providing space for trainees from underdeveloped nations during Caribbean operations. The Development Project recently acquired the 82-foot multipurpose "Calamar," based in Barbados.

Now the Calamar and Undaunted are cooperating southeast of Barbados in tuna explorations--the former using longline gear and the latter bait fishing and conducting oceanographic studies. Their scientists will compare results.



"Oregon II" is Christened



Fig. 1 - Mrs. Harvey R. Bullis Jr., wife of the Base Director, Exploratory Fishing and Gear Research Base, Pascagoula, Miss., breaks a bottle of champagne on the bow of the BCF research vessel Oregon II during christening on February 4 in Pascagoula. At extreme right is Seton Thompson, BCF's Regional Director in St. Petersburg, Fla.

The 170-foot craft is being constructed by the Ingalls Shipbuilding Division of Litton Industries. Scheduled for completion in May, it will be assigned to the Pascagoula Base and become operational after July. It will be used to develop the fisheries of the Gulf of Mexico and Tropical Atlantic.



Fig. 2 - The R/V Oregon II slides down the ways into the "Singing River" following christening. (Photos: Ingalls)



"Oregon" Reports Red Snappers Off Honduras

The recent cruise of BCF's "Oregon" revealed a high catch potential of red snapper off British Honduras. As a result, several U. S. commercial vessels plan to fish experimentally in that area. The first of the fleet was scheduled to sail in mid-February.

If this fishery were developed, it would parallel the one now occurring off Nicaragua. There, about 25 U. S. vessels are fishing successfully for snapper stocks discovered by the Oregon.



BCF and Navy Conduct Oceanographic Explorations

BCF's Gloucester (Mass.) based exploratory vessel "Delaware" is conducting tuna and swordfish explorations in the western North Atlantic during March. The Navy's Oceanographic Prediction Office is taking part in the explorations by providing expendable bathythermograph probes for determining subsurface temperature gradients.

Using these instruments will enable BCF to evaluate the expendable bathythermograph system for use on fishing vessels--and provide the Navy with wanted oceanographic data.



Trade Fairs Sell Calico Scallops

The display and promotion of North Carolina calico scallops by BCF's Office of International Trade Promotion at Paris and Milan trade fairs prompted one of the largest U. S. fishery firms to order 30,000 pounds for export. The manager of the firm's international division has recommended that calico scallops be added to the firm's domestic line.

At the London Frozen Food Exhibit, February 14-23, both breaded and plain calico scallops, individually frozen by a liquid nitrogen process, were displayed.

BCF's exploratory fishing operations along the South Atlantic coast have outlined the boundaries of vast resources of calico scallops. It is expected that the opening of export markets would lead to fuller use of these resources--and aid the overall economic growth of the Southeast Coastal States.



U. S. Fishery Products To Be Shown in Frankfurt

Fishery products produced or processed in the U. S. will be among food items displayed and promoted at the United States Trade Center in Frankfurt, Germany, April 5-14. Frankfurt will be the 11th overseas trade fair in which BCF has participated in cooperation with the U. S. Department of Agriculture.

More information is available from: Office of International Trade Promotion, Bureau of Commercial Fisheries, Room 606, Lynn Building, 111-19th St. N., Arlington, Va. 22209.



FEDERAL ACTIONS

Atomic Energy Commission

ADVANCES FOOD IRRADIATION PROGRAM

Irradiated meat that needs no refrigeration will be produced in commercial quantities under a contract with the Atomic Energy Commission (AEC). The AEC asked for bids before April 17, 1967, on a plant that would produce a million pounds of meat a year for three years.

The U. S. Army, which has a prime interest in the plant, has promised to buy 300,000 pounds of meat a year. Irradiated bacon and potatoes already have been used by the Army in small quantities overseas.

The purpose of the program is to demonstrate the feasibility of large-scale processing of foods at competitive cost. The AEC is putting up \$140,000 for engineering design and \$230,000 for radiation sources. The contractor will pay for the plant.

The Food and Drug Administration already has approved irradiated bacon, white potatoes, wheat and wheat flour for commercial use. The AEC hopes that ham and other pork will be approved in 1967, followed in 1968 by chicken, beef, shrimp, and pork sausage. ("Science News," Dec. 31, 1966.)



Food and Drug Administration

CANNED TUNA NOW INCLUDES BLACKFIN

An amendment to the standard of identity for canned tuna (21 CFR 37.1) to include blackfin tuna in the class of fish known as tuna will become effective March 1, 1967.



Economic Development Administration

FUNDS ASSURE PACIFIC HAKE FISHERY

Funds approved by the Economic Development Administration, Department of Commerce, will be used to develop further the Pacific hake fishery out of Aberdeen, Washington. The funds were requested by the Grays Harbor Regional Planning Commission.

BCF's Exploratory Fishing Base in Seattle will provide technical supervision and

equipment. It will arrange the charter of commercial fishing vessels in test fishing for hake. The use of these vessels may accelerate the development of a domestic fishery.

PROJECT COULD AID COASTAL CLAM FLATS

A \$221,300 grant by the Economic Development Administration (EDA) will help build a sewer system in Waldoboro, Maine, that ultimately will serve over 200 acres of industrial and commercial land. The system also will stop pollution of the area's streams and coastal waters.

The State of Maine Water Improvement Commission states that these waste-treatment facilities will make possible the reopening of coastal clam flats closed 3 years ago because of pollution. This would provide jobs for 100 full-time and 100 part-time clam diggers.

The system will cost \$621,800. Besides EDA financing, Interior Department's Federal Water Pollution Control Administration is granting \$89,640. Local revenue bonds and a State of Maine grant provide the remaining \$310,860.

STUDY OF FISH REDUCTION PROCESS APPROVED

A project to evaluate an experimental fish reduction process applicable to small fishery industries has been approved by the Economic Development Administration (EDA) of the Commerce Department. The project was submitted by BCF's Regional Office in Ann Arbor, Mich. EDA will provide \$148,600 and BCF \$39,400 in services and equipment.

The study will determine and make available to the fishing industry information on: (1) the market potential of experimental processed wholefish product (press-cake) that can be used safely in animal diets, particularly mink; (2) the engineering aspects of producing press-cake; (3) the economics of producing it--including utilization of byproducts.

BCF's Branches of Technology, Marketing and Economic Research will jointly carry out the study.



INTERNATIONAL

U.S. and USSR Agree on Fishing Pact

On February 6, 1967, in Washington, representatives of the United States and the Soviet Union reached agreement on the king crab fishery in the eastern Bering Sea and on several matters affecting their fisheries off the U. S. Pacific Coast.

They reviewed some fishery problems off the U. S. Atlantic Coast and decided to consider them further in late May--just before the annual meeting of the International Commission for the Northwest Atlantic Fisheries.

The U. S. and USSR extended for another 2 years their agreement on king crab fishing on the U. S. Continental Shelf in the eastern Bering Sea. The Soviet quota was reduced from 118,600 cases of canned crab to 100,000 cases.

Soviet Vessels Restricted in Some Ways

A separate 1-year agreement specifies several areas seaward of 12 miles from the Oregon-Washington coast in which Soviet vessels would either refrain from fishing or from concentrating their efforts. In other areas off the Oregon-Washington coast, the 2 nations would take measures, jointly and separately, to protect stocks of fish. Additional protection would be provided for the fishing gear of U. S. halibut fishermen near Kodiak Island, Alaska, in the halibut season. Soviet vessels would transfer cargoes in several designated areas off Washington and Oregon, and off Alaska in the nine-mile zone touching the U. S. territorial sea. Soviet vessels also would continue to fish within the 9-mile zone for the agreement's duration in 2 areas of the central and western Aleutians, and in a smaller area of the northern Gulf of Alaska.

The agreement also provides for cooperation in scientific research, exchange of scientific data and personnel, exchanges of fishermen or their representatives aboard vessels of the two countries, and procedures for reducing conflicts between vessels and gear.

The U. S. delegation at the talks leading to the agreement was headed by Ambassador Donald L. McKernan, Special Assistant for Fisheries and Wildlife to the Secretary of State. The 6-man Soviet delegation was headed by Deputy Minister of Fisheries Mikhail N. Sukhoruchenko. Ambassador McKernan was assisted by advisors from Federal and state fishery agencies, and from sport and commercial fisheries of Alaska, Washington, Oregon, California, Rhode Island, New York, and New Jersey. (Department of State, Wash., D. C., Feb. 6, 1967.)



International Pacific Halibut Commission

PROPOSES 1967 HALIBUT REGULATIONS

The International Pacific Halibut Commission (IPHC) ended its 43rd annual meeting in Seattle, Wash., February 3, 1967. A Convention between the U. S. and Canada authorizes IPHC to investigate and regulate the halibut fishery of the Northern Pacific Ocean and Bering Sea.

IPHC expressed concern to the 2 governments about the effect of increased trawling for other species on the large population of small halibut in southeastern Bering Sea. This area has been set aside as a nursery. All fishing for halibut there has been prohibited in the proposed regulations for 1967.

Scientific findings and conferences with industry impelled the Commission to recommend to the 2 governments these regulations for the 1967 fishing season:

- (1) The regulatory areas shall be: Area 2--All convention waters south of Cape Spencer, Alaska. (Area 1 has been combined with 2.) 3A--between Cape Spencer and Shumagin Islands. 3B--Shumagin Islands to Atka Island, excluding Bering Sea. 3C--west of Atka Island, excluding Bering Sea. 4A--the Bering Sea edge--Unimak Pass to Pribilof Islands. 4B--Fox Islands grounds, Bering Sea. 4C--

edge grounds and Bering Sea side of Aleutian Chain between 170° W. and 175° W. 4D--Bering Sea east of 175° W. and north of a line between Cape Newenham and St. Paul Island and waters west of 175° W. (The flats in southeastern Bering Sea east of Area 4A and south of a line between Pribilof Islands and Cape Newenham have been declared a nursery and closed to halibut fishing.)

(2) Opening and closing hours of regulatory areas shall be 6 p.m., Pacific Standard Time, of date indicated. Exceptions: Area 3C, 4A, 4B, 4C, and 4D where they shall be open at 3 p.m. and close at 6 p.m., local time.

(3) Area 2 shall open May 9 and close when catch limit of 23 million pounds is reached--or on October 15, whichever is earlier.

(4) Area 3A shall open May 9 and close when catch limit of 33 million pounds is reached--or on October 15, whichever is earlier.

(5) Area 3B shall open May 9 and close when catch limit of 3.5 million pounds is reached--or on November 15, whichever is earlier.

(6) Area 3C, west of Atka Island excluding Bering Sea, shall open March 29 and close November 15.

(7) Area 4A--the Bering Sea edge, Unimak Pass to Pribilof Islands--shall open April 3 and close April 17.

(8) Area 4B--Fox Islands grounds, Bering Sea--shall open September 1 and close September 10.

(9) Area 4C--edge grounds between Pribilof Islands and 175° W.--shall open March 29 and close April 22.

(10) Area 4D--east of 175° W. and north of a line between St. Paul Island and Cape Newenham and waters of Bering Sea west of 175° W.--shall open March 29 and close November 15.

The Commission will provide 10 days' notice of closure of Area 2; 18 days' notice of closure of Area 3A; and at least 18 days' notice for Area 3B in 1967.

The next annual meeting will be held in Seattle, Wash., beginning January 23, 1968.

Martin K. Eriksen of Prince Rupert, British Columbia, was elected Chairman, and Harold E. Crowther, Acting Director, BCF, Vice Chairman, for the ensuing year.



International Northwest Pacific Fisheries Commission

JAPAN-SOVIET TALKS START MARCH 1

The 11th annual meeting of the Japan-Soviet Northwest Pacific Fisheries Commission meets in Tokyo March 1 to decide 1967 catch quotas for salmon and crab in north-west Pacific waters covered by the 1956 Japan-Soviet North Pacific Fishery Convention. Measures for fishing operations also will be discussed.

The negotiations are held alternately in Tokyo and Moscow.

Since a bumper year for pink salmon is expected, the Japanese plan to secure a catch quota of 115,000 metric tons--the same as 1965, the previous bumper year.

Japan's 1966 quota was 96,000 tons, a lean year for salmon.

Soviet Firmness Expected

The Soviets are expected to be firm and make new demands. The 1956 treaty expired at the end of 1966 and talks to revise it will be held concurrently with regular fishery negotiations.

Observers expect hard negotiations to decide the 2-year catch quotas for king crabs.

The Soviet Union, signatory to the Continental Shelf Treaty, may have to restrict its crab fishing operations in the Bristol Bay area. Therefore, observers believe she will demand a higher catch in waters covered by the Japan-Soviet Fishery Convention. The Soviet quota last season was 420,000 cases, and Japan's 240,000 cases. (Each case contains 48 half-pound cans.)

South Korea May Enter Waters

Observers believe South Korea's planned advance into waters covered by the Japan-

Soviet Treaty will be another problem discussed.

Government sources expect the Soviets to demand that part of Japan's catch quota be allocated to South Korea if she is allowed to fish in the restricted waters because the USSR does not recognize the Republic of Korea. However, the Japanese are expected to state that they do not plan to help South Korea advance into the fishery grounds.

The area covered by the fishery treaty embraces a wide expanse of water west of 175° W. longitude. The restricted waters were expanded in 1962--and the fishing zones divided into zone "A" and zone "B."

Fishing fleets headed by motherships are allowed to operate in zone "A," covering the area north of 45° north latitude; small fishing vessels operate in zone "B" waters south of 45° north latitude. ("The Japan Times," Jan. 5, 1967.)



Norway May Keep Some Fishing Rights in Greenland

Norway may retain some fishing rights in East Greenland, although they will probably be of little value because the area has few fishery resources. Norway gained limited hunting and fishing rights in East Greenland under a 1924 agreement with Denmark, which controls the island. The agreement expires June 1967. Denmark is reported to have negotiated a compromise continuing Norway's limited fishing rights. (U. S. Embassy, Copenhagen.)



Marine Oils

DECLINE IN 1967 WORLD PRODUCTION FORECAST

A U. S. Department of Agriculture publication forecasts a slight decline in world production of marine oils in 1967 because of

Estimated World Production of Marine Oils, Average 1955-59, Annual 1960-66 and Forecast 1967

Commodity	Forecast 1967	1/1966	1965	1964	1963	1962	1961	1960	Average 1955-59
.....(1,000 Short Tons).....									
Marine oils:									
Whale	155	175	218	249	295	390	428	418	427
Sperm whale	175	170	170	165	149	130	120	122	119
Fish (including liver)	940	935	875	836	684	734	662	512	427
Total	1,270	1,280	1,263	1,250	1,128	1,254	1,210	1,052	973
1/Preliminary.									
Source: "World Agricultural Production and Trade (Statistical Report), January 1967," Foreign Agricultural Service, U.S. Department of Agriculture, Washington, D. C.									

Law of the Sea

BRAZIL MAY RATIFY 1958 CONVENTIONS

The four 1958 Geneva Law of Sea Conventions (on the High Seas, Continental Shelf, Fisheries, and Territorial Sea) are scheduled to be presented to the Brazilian Congress for consideration when the Costa e Silva administration takes over in March. Ratification probably will follow within 3 or 4 months with Brazil entering certain reservations on the Continental Shelf Convention--like those made by other ratifying countries. (U. S. Embassy, Rio de Janeiro, Jan. 19, 1967.)



a further cutback in the Antarctic baleen whale oil quota. The chief factor will be a drop in Japanese production. Sperm oil production likely will be fractionally larger. Increased output by the Soviet Union and the Republic of South Africa is expected to be offset largely by further declines for Japan, Norway, and Peru.

Fish oil production, which set a record in 1966, probably will continue its upward trend in 1967. With record supplies available in 1966, fish oil prices were down sharply.



Norway and USSR Continue Joint Fishery Research Projects

Norwegian newspapers report that joint Norwegian-Soviet research projects will continue in 1967. They were scheduled to begin with a study of capelin resources in the Barents Sea in January-March 1967 by the Norwegian vessel "G. O. Sars" working closely with the Soviet Polar Institute for Marine Fisheries and Oceanography (PINRO).

Norway increased its capelin catch appreciably in 1966. Soviet interest in capelin probably is related to reported Soviet plans to build a fish meal and oil factory near Murmansk--that area's first.

Norwegian concern about possible overfishing in the Northeast Atlantic may be stimulating their research efforts. A newspaper reports that the 1966 Norwegian-Soviet-British research project in the Northeast Atlantic will be continued in 1967. This work includes efforts to assess stocks of cod, herring, and ocean perch in the Norwegian Sea and other areas. The Norwegian research vessels G. O. Sars and "Johan Hjort" will take part in this project in August-September 1967.

Sealing Commission Met in Moscow

The Norwegian-Soviet Sealing Commission met in Moscow, December 15-17, 1966, and heard reports on their sealing catches and scientific investigations of stock in the Northeast Atlantic. The Commission agreed to increase cooperation to attain a rational exploitation of seal resources. The next meeting will be held in Oslo in November-December 1967.

One joint research project involves a study of the Greenland seal by a Norwegian sealing vessel manned by Norwegian and Soviet scientists. (U. S. Embassy, Oslo, Dec. 24, 1966, and Jan. 15, 1967; U. S. Embassy, Copenhagen, Jan. 10, 1967, and other sources.)



Joint Expedition Planned by Brazil and Norway

A joint Norwegian-Brazilian ocean research expedition is planned for the second half of 1967, according to the Norwegian periodical "Bergens Tidende." The expedition vessel "Professor W. Besnard" is being built at a Bergen shipyard for the Oceanographic Institute in Sao Paulo, Brazil. The vessel, Brazil's first for modern ocean research, will be fitted with Norwegian research equipment. NORAD, the Norwegian governmental foreign aid agency, has appropriated 150,000 kroner (US\$21,000) for special equipment for the expedition.

The expedition also will serve as a training program for Brazilian scientists and crew members. The Norwegian participants will include 6 ocean research scientists and 3 senior members of the crew, including the skipper. (U. S. Embassy, Oslo, Dec. 24, 1966.)



USSR Plans 1968 International Fisheries Fair

The Soviet Union's Ministry of Fisheries plans to organize an international fisheries fair in Leningrad for summer 1968. The fair (Inrybprom 68) will exhibit Soviet fishing equipment, processing equipment, fishing techniques, research developments, etc. The Soviets expect many foreign firms to participate. Special attention will be paid to the development of the Soviet fishing fleets with exhibitions of many types of vessels and shipboard advances in mechanization. The Soviets also hope to make many contacts with foreign businessmen to exchange information on fishery developments and to promote their fishery exports. (Tass, Nov. 30, 1966.)



FOREIGN

CANADA

"CANADIAN FISHERMAN" SEES COLLECTIVE RESPONSIBILITY FOR HIGH BOAT LOSSES

An editorial in the January 1967 "Canadian Fisherman" asks: "Why does the Canadian fishing industry lose so many boats through fire, collision, grounding, and bad weather?" Its title "...the wrecks are all thy deeds" is from Byron's poem "about the ocean's harsh tyranny over man," but the editors place on the sea only part of the blame for the death of ships. Yes, the editorial says, Canadian fishermen face extremely rigorous weather and icing conditions and operate in high density traffic. But the forebears of today's fishermen lived with these dangers and were certainly less well equipped for them.

The responsibility, says the editorial is not with the sea but with people. "We fall, year after year, to do anything effective about correcting the root evils of our entire safety environment--the lack of certificates of competency, the lack of load-lines beyond which a fishing vessel may not load, the lack of adequate stability criteria for vessel designers, the lack of adequate fire-fighting equipment. . . . Perhaps we have developed a subconscious and compulsive mental resistance to putting into practice reforms which we know will help to avert tragedy but which may also affect our profit and loss position? Is there any other way to explain how, in 1967, we still lack in the fishing industry such accepted standards of safety as load-line regulations and certificates of competency for skippers?"

Certificates of Competency Are Needed

The editors are fully aware that the requirement of a certificate of competency would idle many fishing skippers. To prevent the abrupt ouster of these older skippers, a gradual phasing-out process, say 10 years, could be adopted. It would give older men a chance to make other plans.

The editorial states: "The introduction of certificates of competency would go along way towards eliminating the causes of most of our losses. First, they would create an

atmosphere of professionalism, an awareness of certain standards, a confidence backed by knowledge rather than guesswork. Second, what is given can be taken away again--the skipper with a certificate of competency will need it for his livelihood; he is unlikely to risk having his certificate suspended or cancelled for overloading, for trying to ride out a storm when he could take shelter, for running a sloppy ship which is a floating accident or fire hazard."

The editors see no excuse for the absence of load-line marks on the hulls of fishing boats. "When a seiner comes round the breakwater, belly deep in the water and decks awash, aren't we delighted? The more fish we bring in, the more money everybody makes--this is the way our 'lay' system works. Isn't it every skipper's fondest ambition to bring in the biggest load of fish. . . to be recognized as the 'highliner' of the fleet? Isn't this 'highliner' caste symbol, in practice, our measure of a skipper's competency?"

And the causes of fire? The editorial says "the vast majority of fires aboard fishing boats occur through slovenly 'shipkeeping.' Equally true, they fail to be extinguished because the fire-fighting equipment is inadequate, or in poor working condition, or inaccessible for one reason or another. We doubt if there is a fire-detection system aboard a single commercial fishing boat in Canada."

Note: The February 1967 issue of "Canadian Fisherman" reports Canadian Government plans to require certificates of competency for masters and mates of fishing vessels over 100 gross tons after January 1, 1968. Applicants will have to pass examinations to qualify for them. However, a special provision will allow current masters and mates to get certificates without examination if they apply before January 1968 and have worked on a vessel of at least 25 gross tons.

SETS LIMIT ON LOBSTER TRAPS

Requests from a large majority of Canadian lobster fishermen on the north shore of Prince Edward Island have led to a lobster trap limit of 500 per boat for 1967 in a portion of Canadian District 7B. This covers the area between East Point and North Cape on Prince Edward Island. It will be effective for the season from May 1 to June 30, 1967.

Canada (Contd.):

The high limit was set because of the short notice given. It probably is the first step toward a lower trap limit in the future. A limit was set in Canadian District 8 in 1966 as an experimental measure to protect lobster stocks and ensure better economic returns to fishermen.

To Survey Lobster Areas

Canada plans to survey this year lobster fishing areas throughout the Maritime Provinces--to see whether greater trap limitations and other controls may be necessary in 1968.

As another interim measure affecting the shore of Prince Edward Island, lobster fishing licenses for part of District 7B will be issued this year only to those who held such licenses in 1966, except for extenuating circumstances.

Also, it is planned this year to register all fishing boats in the Maritime Provinces. The Fisheries Minister feels that further measures may be necessary to protect this valuable industry from overfishing. (Canadian Department of Fisheries, Jan. 31, 1967.)

* * *

EAST COAST HERRING MEAL
INDUSTRY EXPANDS

Three new herring fish meal plants have been set up on Canada's East Coast during the last 18 months. A fourth is scheduled to be built in Stephenville, Newfoundland.

Plans for a fifth plant were announced Jan. 25, 1967, by the Canadian Fisheries Minister. The new plant will be on Campobello Island in New Brunswick. Scheduled for completion in June 1967, the plant will have a daily capacity of 350 tons of herring yielding 70 tons of fish meal and 35 tons of fish oil. Processing capacity could be expanded later. The plant is being built by Canadian Seafood Ltd., reportedly a partnership of a German and a local company.

In British Columbia, some herring seiner operators are reported planning to transfer their vessels to the East Coast when the West Coast fishery closes in March. (U. S. Embassy, Ottawa, Feb. 1, 1967, and other sources.)



SOME FISH "TASTE" WITH THEIR FINS

If man could taste with his fingertips and toes, he would have an ability which is not uncommon among certain fish. A study of two fish species which locate food with sense organs in modified fins was described in a joint paper by a scientist with the University of Michigan and his associate with the University of California.

Modified pelvic fins of the squirrel hake are transformed into tendrils which trail below and in advance of the fish, it was explained. The modified fins are studded with taste buds. Laboratory work indicated that those sensory organs are sensitive to food decomposition products in the water.

Another species, the searobins, exhibits modified pectoral fins which are essentially digging organs. Oscilloscope records from nerves of the fins showed them to be sensitive to mechanical, chemical and thermal stimuli.

Fish having the adapted fins appear to depend on them. When the fins were missing on either side, the fish had difficulty locating food in that direction.

Modified fins of fish may be useful in other ways. During mating periods, some fish appear to identify mates by their fins. (The University of Michigan News Service, Ann Arbor.)

LATIN AMERICA

Argentina

ADOPTS 200-MILE MARITIME JURISDICTION

On January 4, 1967, Argentina extended its maritime jurisdiction over adjacent waters 200 nautical miles from low tide. In the Gulfs of San Matias, San Jorge, and Nuevo, the distance will be calculated from base lines drawn from headland to headland. Also, sovereignty is extended to the adjacent "sea bed and subsoil of submarine zones" up to the 200-meter isobar--or beyond that depth where exploitation of natural resources is feasible. Freedom of air and sea navigation is not affected.

Within 90 days, the Argentine Government is scheduled to issue permanent regulations on foreign exploitation and exploration of the sea resources within the 200-mile zone. Until then, these temporary measures apply to foreign fishing and conservation: the Chief of Naval Operations (CNO) will issue permits (to expire March 29) to foreign flag vessels for fishing beyond the 12-mile zone; Naval Operations will verify that foreign vessels comply with requirements of the Convention of Safety of Human Life on the High Seas and charge an inspection fee of 10,000 pesos (US\$12.82); foreign vessels authorized to fish must communicate positions daily; and foreign vessels currently fishing have 15 days to comply with the temporary measures.

Brazil Disturbed by Action

Foreign vessels now fishing within the newly claimed Argentine waters are believed to be Brazilian, Uruguayan, Soviet, and perhaps Japanese.

Brazil believes the Argentine 200-mile jurisdiction will seriously impair Brazilian fishing for hake off the Argentine coast. A Brazilian Navy official also expressed deep concern and termed the action an acute threat to Brazilian interests. On the other hand, public reaction in Peru favored the Argentine declaration as helping the 200-mile claim "to be incorporated into Latin American international law." (U.S. Embassies in Buenos Aires, Jan. 4, 1967; Rio de Janeiro, Jan. 6, 1967; and Lima, Jan. 7, 1967.)

Foreign Vessels Need Authorization To Fish

Starting January 29, 1967, foreign vessels fishing in the Argentine 200-mile Maritime Zone will be required by Argentina to obtain authorization. (U. S. Embassy, Buenos Aires, Jan. 18, 1967.)

SOVIETS PROTEST ARGENTINA'S 200-MILE MARITIME JURISDICTION

On February 2, 1967, the Soviet Embassy in Buenos Aires issued a statement disputing Argentina's right to extend unilaterally its maritime jurisdiction to 200 miles. The Soviet statement accuses Argentina of violating the rights of other states to fish on the high seas guaranteed by the 1958 Geneva Convention on the High Seas. (Argentina, however, has not ratified the Convention.) The USSR rejects the notion that any nation has the right to extend its sovereignty beyond 12 miles, or otherwise interfere with freedom of the high seas.

The Soviet Embassy's statement added that the payment of fishing fees to Argentina was done only for "commercial reasons upon instructions of boat owners." The statement expressed Soviet expectation that Argentina will reconsider its position. (U. S. Embassy, Buenos Aires, Feb. 3, 1967.)

Comment: It is known that Soviet fisheries operations on the high seas are supervised by the Ministry of Fisheries and that Soviet vessels engaged in distant-water operations are not privately owned.

One Soviet Captain Reportedly Accepted Change

Earlier, it was reported that the captain of a Soviet factoryship deposited 400,000 pesos (US\$2,000) to cover inspection fees for 40 Soviet fishing vessels operating in Argentine-claimed waters.

The captain and the Argentine Navy agreed that Soviet vessels would concentrate 40 miles off the coast of Necochea and off Valdes Peninsula, Chubut Province, where the Argentine Navy will board, inspect, and deliver individual licenses.

Argentina (Contd.):

The Argentine Navy announced the beginning of enforcement patrols on January 29. Any unlicensed foreign fishing vessel found inside the 200-mile maritime jurisdiction will be given 8 hours to begin to leave the 200-mile area--or pay a 10,000 peso (US\$50) license fee. If the vessel refuses either, the Navy will escort it to the nearest Argentine port.

The Foreign Office told the press on January 27 that Brazil has formally raised questions regarding the new law and its application. Argentine officials met January 26 to study Brazil's proposal for negotiations and to consider implementation of the new fishing regulations. (U. S. Embassy, Buenos Aires, Jan. 27, 1967.)



Cuba

WILL NOT RECOGNIZE ARGENTINA'S 200-MILE WATERS

On Jan. 28, 1967, the Cuban Ministry of Foreign Affairs condemned the "arbitrary" and "irrational" decision of the "Argentine Military Government" to extend unilaterally its territorial waters to 200 miles. It called the act "a flagrant violation of the 1958 Geneva Convention" adopted by a majority of nations, among them Argentina.

Cuba pointed out to Argentina that if the U. S. extended its territorial waters to 200 miles--that would encompass all of Cuba, only 90 miles from the U. S. coast. The Cuban Government, therefore, will not recognize the Argentine extension--either "de facto" or "de jure." The statement called the "payment of any tribute" to Argentina for the right to fish within its claimed waters "immoral, clumsy, and cowardly."

Cuban tuna vessels have been reported fishing along the Brazilian and Argentine coasts in recent months, sometimes with Soviet vessels.



Mexico

EXTENDS FISHERIES JURISDICTION TO 12 MILES

The law extending Mexican fisheries jurisdiction from 9 to 12 miles was promulgated in "Diario Oficial" on January 20, 1967. The law permits foreign nationals now fishing in the 9- to 12-mile zone to continue without restriction for one year starting January 1, 1967. During 1967, Mexico will negotiate with these countries conditions permitting their nationals to continue fishing for a maximum additional 5-year period--through 1972. Starting in 1973, however, no foreign country will be permitted any fishing rights within the 12-mile limit, nor will the historic fishing rights of nationals of any country be recognized. (U. S. Embassy, Mexico, Oct. 21, 1966, and Jan. 23, 1967.)

FIRM MAKES SHIPBOARD FISH MEAL PLANTS

A Mexican firm reportedly has manufactured some shipboard fish meal plants to be installed aboard shrimp vessels for processing incidental catches of trash fish into fish meal. Several plants already have been distributed and installed aboard shrimp vessels operating out of Mazatlan, Mexico. The fish meal is produced at a relatively low cost because the same crew operates the fish meal plant. The quality is satisfactory. The fish meal competes successfully on the world market with other meal produced by shore plants. The shipboard plant is capable of producing 1.5 tons of fish meal daily. It is patented in several countries, including the U. S. Write to: Mr. Ing Hector Vargas, Productos Marinhos Industrializados, S. A., Mexico 6, D. F. Mexico.



Chile

FISH MEAL AND OIL PRODUCTION IS UP

Chile's anchovy catch for October 1966 (principally in Arica and Iquique areas) was 14,474 metric tons; it was 4,653 tons in October 1965 and 57,838 tons in October 1964.

Chile (Contd.):

From January-October 1966, the catch was 1,016,743 tons, compared to 310,059 tons in 1965 and 792,700 tons in 1964 for the same period.

Month	1966	1965	1964
 (Metric Tons)		
January	33,504	12,836	24,131
February	27,113	11,371	23,576
March	13,536	10,278	4,768
April	14,068	3,587	16,373
May	26,708	4,090	16,232
June	18,783	2,989	17,271
July	17,872	2,188	6,978
August	17,920	3,651	5,783
September	11,625	794	11,250
October	2,757	888	11,007
Total (10 months) . . .	183,886	52,672	137,369

Chilean production of fish oil from anchovy during October 1966 was 323 metric tons, compared to 61 tons in October 1965 and 904 tons in October 1964. Fish oil production for January-October was 17,829 tons in 1966, 6,035 tons in 1965, and 14,844 tons in 1964.

The price paid to the independent vessels for anchovy fluctuated between 50 and 55 escudos (US\$11.10 and 12.20) a metric ton.

Also, from Antofagasta to Talcahuano, the use of other species (principally sardine, hake, and anchovy) for fish meal yielded 2,872 tons in October 1966 compared to 1,361 tons in October 1965. Meal production for January-October 1966 was 24,786 tons; it was 17,692 tons in the 1965 period.

Exports of fish meal for January-July 1966 were 115,492 metric tons worth US\$16,182,356 f.o.b. Chile. Exports went mainly to the U.S., Netherlands, and West Germany. Exports of fish oil through July 1966 were 10,792 tons worth US\$1,825,652 f.o.b., destined for The Netherlands, West Germany, and France. (Institute of Fishery Promotion, Santiago, Nov. 23, 1966.)



Ecuador

FISHING INDUSTRY GROWS

Ecuador's fishing industry continues to grow. Exports of canned and frozen tuna, shrimp, and spiny lobster are increasing appreciably. The increase in tuna exports

occurred despite a bait shortage that prevented attainment of the full potential catch.

In July 1966, the Government authorized duty-free entry for equipment and materials required by local fishermen. In October, it reorganized the Fisheries Institute to increase its scientific and technical assistance to the industry. Also, Ecuador has agreed to the conservation measures on yellowfin tuna recommended by the Inter-American Tropical Tuna Commission.

The new Merchant Marine Academy founded at Guayaquil in mid-July 1966 includes fishing operations in its curriculum. The Government is considering enactment of a National Fishing Law.

These promising Government moves have encouraged private enterprise to enter the fishing and fish packing field on a large scale.

Subsidiaries of Foreign Firms Active

Among established firms, a subsidiary of a California tuna packer is expanding in Manta; a subsidiary of another California firm recently established a tuna-freezing operation in Manta. Among new firms, one in Guayaquil is canning "Pinchagua" sardines, and another is packing shrimp; at Salinas, a firm has been organized to produce industrial fishery products, and another announced plans to produce annually 2,240 tons of "fish flour" and 112 tons of oil. A Chilean fishing firm has studied plans for tuna packing at Santa Rosa using Chilean tinplate for cans; at Manta, another Chilean-owned firm readied its two 500-ton refrigerated tuna vessels for fishing. A fishery affiliate of a large construction firm organized a Galapagos-based freezing and canning operation. Also, at the northern port of Esmeraldas, a fishery firm made its initial 3-ton shipment of frozen shrimp to the United States, with similar semi-monthly shipments scheduled for the future. Another large firm planning to build a modern long-range fishing fleet continued negotiations with a financing group. (U. S. Embassy, Quito, Jan. 14, 1967.)

ISSUES TEMPORARY FISHING LICENSE

Ecuadorian authorities are issuing to U.S. vessels a temporary document valid in place of register and fishing license. The docu-

Ecuador (Contd.):

ment can be shown if a vessel is stopped by Ecuadorean patrol craft. Three U. S. vessels claim that register and license have been secured quickly, with good cooperation from the fishing inspector and port captain's office in Guayaquil. One U. S. vessel arrived early one Sunday morning and sailed with a validated temporary document at noon the same day. (U. S. Consulate General, Guayaquil, Jan. 30, 1967.)



Venezuela

WHOLE SARDINES MAY NOT BE USED FOR FISH MEAL

The Venezuelan Government has reaffirmed that whole sardines may not be used for fish meal--a conservationist position. While it is generally accepted that the sardine resources are presently underexploited, it is readily acknowledged that there is insufficient evidence to prove that uncontrolled fishing would not endanger them. The fishery employs 5,000 workers and is an important food for low-income groups.

The reaffirmation resolved a controversy between the sardine canneries of Cumana and the fish reduction plant of Puerto La Cruz--which a Government resolution had triggered.

The resolution was designed to enlist the aid of private fishing vessels in experimental fishing and providing data on fishing effort and catch necessary to better evaluate Venezuela's fishing potential, particularly the sardines. Private vessels can work in restricted areas if fishing data are kept and submitted to Government authorities. Canneries have priority on sardines caught by these vessels up to 80 percent of their installed capacity; however, 20 percent of their catch may be assigned as whole fish to reduction plants after they meet previous obligation to canneries.

Reduction Plant Owner Saw Green Light

The new owner of the reduction plant at Puerto La Cruz interpreted the latter provision as a change in the standing prohibition on using whole sardines for meal. The plant offered Bs100 (US\$22.32) per ton at

plant side compared to Bs40 (US\$8.93) per ton paid by the canneries. Priority rights of the canners and identity of catch were lost with the large margin in price; net fishermen and experimental vessels sold to the reduction plant's pick-up boats.

The dispute broke as the 1966 sardine season was closing. The canneries took advantage of the seasonal layoffs to obtain a high-level decision on the use of whole sardines by reduction plants. The standardized price structure between canneries and fishermen for the 1967 season was jeopardized. Moreover, most canneries have small reduction plants and probably would modernize those facilities during the off-season--if there was a good possibility of using whole sardines for meal. The canneries, citing the U. S. experience on the California coast, noted that limited sardine fishing is still maintained there. They recalled the noticeable depletion of sardine resources in 1955 when Venezuela permitted uncontrolled fishing. The high employment among low-income coastal families lent political weight to the canneries' claim to priority.

The Puerto La Cruz reduction plant owner contended that the sardine resources, with an annual potential placed at 400,000 tons by the La Salle Foundation, could support a reduction industry. He argued that the canneries, now consuming around 40,000 metric tons, must pay a better price to the fisherman to encourage greater effort and support modernization of fishing equipment. He noted that the recent French Mission found the price paid for sardines in Venezuela one of the world's lowest.

Council Formed To Study Industry

Venezuela's regulations continue to restrict the fish reduction industry to three species of whole fish, rabo amarillo (*Cetengranlis edentulus*), bagre (*Arius spixii*), and machuelo (*Opisthonema oglinum*), and canneries offal. The dispute, however, focused attention on the fisheries industry and its potential. President Leoni has named a National Council of Fisheries Development of three commissions: Fisheries Investigations, Fisheries Administration, and Industry Arbitration.

The U. N. Special Fund Project for Fisheries Research and Development, requested by Venezuela, is in the final stage of prepa-

Venezuela (Contd.):

ration. This joint 5-year project should begin in 1967, bringing to Venezuela internationally known fisheries experts. (U. S. Embassy, Caracas, Dec. 13, 1966.)



Brazil

SOVIETS SEEK BRAZILIAN MARKET

In January 1967, the Soviet stern trawler "Livadia" (Tropik-class RTM-7023, 2,600 gross tons) reached Porto Alegre in southern Brazil to deliver 400 metric tons of frozen fish at a low price of US\$145 a ton (about 7 U. S. cents a pound). (U. S. Embassy, Rio de Janeiro, Jan. 6, 1967.)

The Livadia was unable to sell her catch and departed on Jan. 6, 1967. No fish wholesaler in Porto Alegre would buy the "carapina" because it was not familiar to the public. The fishing industry reportedly was shocked by the low price of Soviet fish--60 percent below the going local prices. The Brazilian Bureau of Fisheries at Porto Alegre protested to Rio that the sale would be harmful to the local industry already troubled by "glutted markets."

The Livadia, of the Sevastopol High-Seas Fisheries Administration, arrived on the Patagonian Shelf fishing grounds in October 1966. The catch of 400 tons (880,000 lbs.) in less than 2 months was fair fishing.



Peru

REPORT ON FISH MEAL INDUSTRY

The Peruvian fish meal industry is in economic difficulty partly because of an industry-wide strike, November 1-December 14, 1966, and the continuing lower world price. Although this price strengthened during the strike, it is still much below recent years and even below the break-even point for many plants. There is little optimism that the price will rise much this season.

The prolonged strike reduced Peruvian fish meal stocks, which were substantial

shortly after the fishing season began September 1, 1966. However, the strike put many plants in serious difficulties because they could not meet payrolls or other expenses. Also, the increases won by the strikers place a greater burden on companies already in the red.

Further, the crews of almost 2,000 purse seiners and 150 plants, roughly 40,000 workers, were unproductive during the 3-month closed season that ended September 1, and during the strike. The strikers have gone back to work for 30 days, pending acceptance of their demands.

Peru Requires Export License

This key industry's troubles impelled the Government to require, effective January 1, 1967, fish-meal export licenses, and fish meal to be sold abroad on quota system and allocation of markets by the National Fisheries Association.

In 1966, Peru produced 1,470,478 metric tons of fish meal; in 1965, 1,282,011; in 1964, 1,552,214; in 1963, 1,159,233 tons. Almost all fish meal is exported. Peru uses only about 20,000 tons; this is expected to increase somewhat this year.

Semirefined fish-oil exports, virtually total production because Peru uses little, in June-October 1966 were 56,052 tons.

Prices: Due to, and during the strike, the price rose from about US\$120 a ton for meal f.o.b. Callao to \$130 a ton. On December 21, the price was down to about \$128 a ton for meal; on January 3, 1967, it was the same. Crude fish oil on December 6 was \$154 c.i.f. Europe, and semirefined about \$160 a ton--up about \$14 in 6 weeks. On December 21, semirefined oil was \$175 a ton, crude oil \$160.

Fish meal prices are not expected to rise above \$135 a ton f.o.b. Callao during the next few months--which will not bring many companies a profit.

1967 Closed Season: The closing date of the current fishing season has not been announced. It is expected that the Government will set a season limit between 7.5 million and 8 million metric tons of anchovy. Because the strike was long, the closed season (usually June, July, and August) may be reduced.

Peru (Contd.):

Plants: As of November 15, 1966, there were 150 idle fish meal plants. During 1966, only 2 plants produced over 40,000 tons of meal each; one produced over 30,000 tons; 15 plants over 20,000 tons each; and 103 plants each under 10,000 tons. The industry still has many small producers.

Twenty-three plants were closed for non-strike reasons: they had no fishing fleet, no money to operate, had been foreclosed, or were too deteriorated.

Locations: The 150 plants are in 23 localities along the coast. However, 83 of the plants are in 4 places (Chimbote, Callao, Supe, and Tambo de Mora) and produced 59 percent of the fish meal so far this calendar year.

Destination: Over 50 percent of Peru's fish meal exports goes to 3 countries: West Germany (20.9 percent), the U. S. (19.9 percent), and Holland (10.7 percent).

The Strike: The fishermen's union (Federacion de Pescadores del Peru) struck for the following increases: 35.00 Soles (US\$1.30) per ton of anchovy caught for the crew, plus 6.30 Soles (US\$0.24) per ton for fishermen's benefit fund (Caja de Beneficios del Pescador), plus 1.95 Soles (US\$0.07) for social assistance fund (Fondo de Asistencia y Prevision)--a total increase of 43.25 Soles (US\$1.61) per ton.

On November 25, 1966, the Government granted a 22.00 Soles (US\$0.82) per ton increase--both sides rejected it.

On December 13, 1966, the union lifted the strike for 30 days until the Government could study its demands further. The fishermen won an increase of 22 Soles (US\$0.82) per ton of catch, in food allowances for ship's crew, in wages of ship's engineer--a total of about 31.50 Soles (US\$1.18) a ton for fish caught or US\$7.00 a ton for fish meal produced.

The producers claim they cannot afford any increase. They are seeking Government assistance through tax reductions (there is a direct tax of US\$8.00 plus a indirect tax on exported meal). However, the Government needs all its revenue.

Government Regulations: The Government, on December 9, 1966, undertook to regulate production and marketing of fish meal. A decree designates Marketing Committee of National Fisheries Association to work with Ministry of Agriculture, Industrial Bank, and fisheries associations to adopt a system of agreements on marketing fish meal. This will include setting marketing price and quotas for buyers.

Current Fishing Season: The current fishing season is the finest on record, but the industry still is plagued by a relatively low market price of near US\$130 a metric ton for fish meal f.o.b. Callao (on January 13, 1967), and mounting stocks. Stocks on hand on Dec. 15, 1966, were 279,000 metric tons. By year-end, 59,000 tons were shipped, but roughly 180,000 tons were produced in that same period, bringing stocks near 400,000 tons.

In January 1967, about 80,000 tons are expected to be shipped. But production will exceed 300,000 tons, increasing inventory to about 600,000 tons.

The Institute del Mar will recommend cessation of fishing from February 15 to March 30, 1967, to permit growth of immature fish--and continuation of fishing into June, possibly later, with maximum allowable catch of 8 million metric tons of anchovy for the season. The Institute also may recommend a 5-day week for fishing fleets.

The prospect for companies in heavy debt is bleak. Reliable sources continue to forecast a major industry shakedown. An industry leader said 40 percent of production is foreign owned--and will increase if the Government does not aid the fish meal industry. (U. S. Embassy, Lima, Jan. 7 and 19, 1967.)



EUROPE

USSR

AVERAGE PACIFIC OCEAN PERCH CATCH IS SMALLER

During the last 3 years, the Soviet average daily catches of Pacific ocean perch per large stern factory trawler (BMRT) decreased 35 percent. In 1964, each BMRT caught an average of 41 metric tons (90,000 lbs.) per day; in 1965, this average catch decreased to 38.4 tons; and in the first 9 months of 1966 to 27 tons.

Soviet Far Eastern fishery officials attributed the lower average daily perch catches to the fact that fishermen have not adapted fishing gear and methods to new conditions--not to biological depletion of stocks.

They accused the Sakhalin and Primorskii Krai Fisheries Administrations of red tape. They claimed that midwater trawl and pair-trawl gear is available, but it is not issued to fishermen in perch, hake, herring, wall-eyed pollock, and other fisheries. They urged immediate introduction of midwater and twin trawling in Soviet Pacific fisheries, especially in the newly developing pelagic fisheries. Most Soviet Pacific ocean perch catches are landed from fisheries off the U.S.-Alaska coast.

ANTARCTIC WHALING FLEET IS SMALLER

For the 1966/67 antarctic whaling season, only 3 of the usual 4 Soviet whaling factoryships were assigned to hunt and process whales: the "Iuri Dolgorukii" from Kalinin-grad; the "Sovietskaia Ukranina" from Odessa; and the "Sovietskaia Rossiia" from Vladivostok. The fourth factoryship, the "Slava," was reassigned this season to North Pacific whaling.

The three Soviet motherships began whaling early in December 1966. A large group of scientists is aboard to study the biology of whales and their concentrations. One result of prior whaling research (now concentrated at Odessa) was the determination of the whale's life span at 30-40 years.

AMUR RIVER SALMON RAN LATE IN 1966

The 1966 migration of Pacific chum salmon into the Amur River occurred unusually late. In normal years no salmon reach the spawning grounds later than about mid-September. In 1966, however, chum salmon continued to migrate until the end of September. Soviet scientists believe the fish were delayed by storms in the Sea of Okhotsk and the Tartary Straits. Despite the late migration, all fishing for salmon ceased by mid-September to allow more chum to reach the spawning grounds to help build up the decimated stocks.

To protect spawning salmon migrating upstream, the Soviet Far Eastern lumber industry was asked to truck timber rather than float it down river during the salmon spawning season. Many fish hatcheries, and pools where young fish can grow undisturbed, have been built along the Amur River.

SAKHALIN LOOKS AHEAD 15 YEARS

The Scientific Council of the Sakhalin Institute for Fisheries and Oceanography met in December 1966 to discuss the present condition of fishery resources around Sakhalin and the development of its fisheries during the next 15 years. Two conclusions were reached: (1) Fishery resources around Sakhalin Island are not fully exploited. The catch can be increased several times. (The principal species caught are Alaska pollock, squid, Pacific cod, ling cod, anchovies, shrimp, and seaweed.) (2) Sakhalin catches in the eastern Pacific and Bering Sea also can be increased. Species mentioned were flounder, herring, ocean perch, sablefish, and hake. Sakhalin fishermen made good 1966 hake catches. Their yearly plan provided for only 6,000 metric tons. By December 2, when the fleet left the Pacific northwest fishing grounds, they had caught 24,000 metric tons.

The entire Soviet Pacific hake catch in 1966 was 130,000-140,000 metric tons, all caught off Washington and Oregon.

JAPANESE TECHNICIANS OBSERVE SOVIET NORTH ATLANTIC OPERATIONS

In October 1966, 4 Japanese observers boarded the 2,500-ton Soviet stern trawler

USSR

"Push
They
South
proce
lets,
cod a
ducti
which
ical
gear
their
Japa
omm
toma

T
and
clud
1966
1966

TEA
JAP

pan
US
and
ves
Sou
fish
Mi
tun
me
"K
sch
for
lon

re
gr
un
ab
Sh
No
a

C
S'

al
U

USSR (Contd.):

"Pushkin" in the Northwest Atlantic area. They spent 40 days aboard Soviet vessel off Southern Labrador and observed fishing and processing of cod and ocean perch into fillets, canned cod liver, cod-liver oil, dressed cod and perch, and meal. Average daily production used only 20 metric tons of fish a day, which the Japanese say would be uneconomical for them. They also reported Soviet gear and equipment less sophisticated than their own. Soviet sources report that the Japanese made "a number of practical recommendations in handling trawls and in automating trawl winches."

The visit was part of the Fishery Science and Technology Exchange Agreement concluded between Japan and the USSR in mid-1966. ("Suisan Keizai Shimbun," Dec. 26, 1966, and other sources.)

* * *

TEAM OBSERVES
JAPANESE TUNA FISHING

A Soviet tuna fishery team arrived in Japan December 23, 1966, under the Japan-USSR fishery technical cooperation program and was scheduled to board Japanese tuna vessels to observe fishing operations in the South Pacific. The team consisted of one fishery expert from the Soviet Fisheries Ministry, a navigator assigned to a Soviet tuna factoryship, and an interpreter. The members boarded the Japanese tuna vessel "Kuroshio Maru No. 11" (180 gross tons) scheduled to depart Tokyo on December 28 for the South Pacific Ocean (near 178° W. longitude and 8° S. latitude).

On January 18, 1967, the Soviets transferred at sea to the "Banshu Maru No. 5" (3,677 gross tons) to observe fishing operations until February 26, 1967, then return home aboard a Soviet vessel. ("Suisan Keizai Shimbun," Dec. 26, 1966.)

Note: Later reports said Soviets returned to the USSR because accommodations aboard the vessels were unsatisfactory.

* * *

CANADIANS AND OTHERS
STUDY TRAINING OF RECRUITS

In December 1966, eight Canadian Federal and Provincial officials were in the Soviet Union studying the methods used in training

recruits for the fishing fleet. Led by Lloyd J. Crabbe, Administrator of the Vocational Training Program, Industrial Development Service of the Canadian Department of Fisheries, the group visited the navigational and technical fishery schools at Murmansk and Rostov on the Don.

The tour resulted from a proposal of the Canadian Federal-Provincial Atlantic Fisheries Committee. Under a reciprocal arrangement, Soviet fishery officials will visit Canada in 1967 to study Canadian training methods.

The visit by Canadians follows one by the Norwegian Fisheries Minister with a group of experts; a visit by a Japanese team which spent a month aboard Soviet vessels; fishery research exchanges with Norway, Britain, and Iceland; and an October 1966 FAO seminar for trainees from 8 underdeveloped nations.



Denmark

GOVERNMENT BANK LOANS ROSE
IN FISCAL YEARS 1965-66

The Royal Danish Fisheries Bank, a Government bank that makes loans to the fishing industry, received 244 loan applications in fiscal 1966, April 1, 1965-March 31, 1966--75 more than the previous year. The Bank made 168 loans in fiscal 1966 totaling 30.5 million kroner, US\$4.4 million, compared with 20 million kroner, \$2.9 million, in fiscal 1965.

Losses on loans during fiscal 1966 amounted to 37,805 kroner (\$5,481); total funds on loan increased to 137.3 million kroner (\$19.9 million). Loan payments amounted to 10.5 million kroner (\$1.5 million). Interest paid totaled 7.5 million kroner (\$1.1 million).

During fiscal 1966 the Bank financed loans by issuing two series of bonds paying 7 percent interest and one series paying 6 percent. (When a loan is approved, the fisherman receives bonds for the amount of the loan and must sell them to receive his funds.)

In October and November 1965, many applications were received for loans on large vessels. If the Bank had allowed loans for all

Denmark (Contd.):

Purpose	Fiscal 1966			Fiscal 1965		
	No. of Loans	Value		No. of Loans	Value	
		Kr. 1,000	US\$1,000		Kr. 1,000	US\$1,000
Purchase of:						
New vessels	94	21,335	3,093	64	11,549	1,675
Used vessels	26	2,355	341	14	1,403	203
New motors	29	1,560	226	9	287	42
Power block	1	68	9	-	-	-
Echo sounder	-	-	-	2	6	1
Industrial use	17	5,182	751	24	6,672	967
Reorganization loans for fishermen in difficulties	-	-	-	1	58	8
Marketing	1	20	2	5	89	13
Total	168	30,520	4,422	119	20,064	2,909

applications, its legal limit would have been reached rapidly. Thereafter, loans would have been limited to the amount repaid by debtors during the year, or about 10 million kroner. Therefore, following discussions with the Danish Fisheries Minister, the Bank management decided to control the rate of lending by instituting a priority system: Applicants needing immediate assistance would be favored over those with usable vessels.

The Bank has proposed legislation to the Fisheries Minister raising the program's legal limit. (U. S. Embassy, Copenhagen, Jan. 11, 1967.)

* * *

SOLVENT PROCESS CAN PRODUCE HIGH-QUALITY FISH MEAL

A Danish newspaper reports that a solvent-extraction process to remove smell and taste from fish meal has been developed by the technological laboratory of the Danish Fisheries Ministry. Cost of the process is competitive with other processes for producing high-protein mixtures. The process reduces oil content of fish meal making it more desirable as pig feed. (U. S. Embassy, Copenhagen, Jan. 10, 1967.)

* * *

REQUIRES DATE MARKING OF PRESERVED FISH

Starting January 1, 1967, all canned fish products sold in Denmark must bear a mark showing week they were produced. Either open marking or a code can be used on sterile canned products; but any code used on semipreserved items (those having a limited shelf life) must be understandable to the consumer. Also, semipreserved fish items must

be stamped "halvkonserves." The requirements apply to all such products, domestic or foreign. (U. S. Embassy, Copenhagen, Jan. 10, 1967.)



Iceland

1966 FISHERIES CATCH SET RECORD

The 1966 Icelandic fish catch (preliminary data) was a record 1.24 million metric tons compared to 1,199 million tons in 1965. The 1966 catch was (comparable 1965 data in parentheses): herring 775,000 (763,000) tons, capelin 125,000 (50,000) tons, groundfish 335,000 (381,000) tons, and lobster and shrimp 5,000 (5,000) tons.

The 1966 catch showed a slight increase due to larger herring and capelin catches. However the total export value probably will be substantially lower than 1965 because of lower quantity and prices for the groundfish catch and the decline in world market prices for fish oil and meal. The groundfish catch declined about 46,000 tons, one important reason for the difficulties of freezing plants and trawler industry.

Reasons for Smaller Groundfish Catch

The continuing decline in groundfish catch in recent years is attributed to declining fish stocks, lack of modern trawler fleet, and a shift to herring fishing. The considerable increase in capelin catch resulted from a greater effort by the fishing industry. It is considered a good development because capelin abound off Iceland's coast. Capelin are used primarily to produce fish meal and may compensate partially for any downturn in the

Iceland (Contd.):

herring catch. (U. S. Embassy, Reykjavik, Jan. 12, 1967.)

GROUND FISH INDUSTRY FACES PROBLEMS

Heavy operating losses have been reported by the large trawlers (700-1,000 gross tons) that supply about 20 percent of the Icelandic groundfish catch. High costs and exclusion from Iceland's 12-mile fishing zone are blamed by the trawler operators for their losses. The Icelandic long-line and seine-net vessels that can operate within the 12-mile limit supply about 80 percent of Iceland's groundfish catch. However, those smaller vessels are being used more in the expanding herring fishery.

The Icelandic Government is reported considering measures to stimulate the groundfish industry.



Norway

1966 LANDINGS AND EXPORTS HIT RECORD

Heavy catches of herring by her modernized purse-seine fleet raised Norway's 1966 fishery landings to a record 2.64 million metric tons. The exvessel value was 1,304 million kroner (US\$183 million). These were increases of about 27 percent in quantity and 18 percent in value over the previous record catch in 1965.

The value of Norwegian exports of fishery products reached a new record in 1966 of 1,575 million kroner (US\$221 million). This was an increase of about 150 million kroner (US\$21 million) above 1965's record exports. (The Export Council of Norway, January 1967.)

SCIENTISTS PREDICT DECLINE IN COD STOCKS

Scientists say that there may be poor years ahead for Norwegian fisheries for small cod in 1969 and 1970--and for fisheries on larger, sexually mature cod in 1973 and 1974. Stud-

ies of cod reproduction conducted by the Norwegian Institute of Marine Research show that the 1965 and 1966 year-classes failed seriously. Practically no reproduction of those year-classes was found. The reason is not known; however, it is assumed that some catastrophe occurred during spawning. Future research will seek the specific cause. "Fiskaren," Jan. 11, 1967.)



West Germany

TO EXPAND FISHING OFF SOUTH-WEST AFRICA

West Germany will send 12 factoryships and trawlers to join 15 foreign nations now fishing off the coast of South-West Africa. Several German fishing companies have formed a consortium to own and operate a large distant-water fishing fleet. The 12 vessels will be a start.

The vessels will be ultramodern trawlers similar to the "Sagitta Maris" and "Weser" already operating off that coast. They will be fitted with filleting and fish-meal plants and will first concentrate mainly on white fish (hake). Later, they may turn to pilchards and, like the "Willem Barendsz" and "Kosmos V," operate a fish-meal factoryship for pilchards off that coast.

The new West German fleet will be headed by the Government's modern fisheries research vessel "Walther Herwig," which will carry out intensive fisheries research in those waters.

The research vessel and part of the fleet are expected in those waters within the next month or two. ("Namib Times," Walvis Bay, Jan. 13, 1967.)



Ireland

AIMS TO DOUBLE FISHERIES EARNINGS BY 1970

One of the main goals of an expanded fisheries aid program recently outlined by the Irish Government is to double the earnings of its fisheries. At present, Ireland is limited

Ireland (Contd.):

mainly to inshore fishing yielding an annual catch of 30,000 to 40,000 metric tons. However, this modest catch provided export earnings of US\$5.5 million in 1965.

The Government will encourage construction of middle-distance vessels--two 107-foot stern trawlers were added in 1966--to expand the fleet. Government programs will be broadened in credit, training, product development, and export promotion. Compulsory standards will be introduced to regulate fish handling from the catching point through the entire distribution system. The Irish Minister for Agriculture and Fisheries said it was necessary to develop a "quality image" for Irish export products. ("Irish Skipper," January 1967, and other sources.)



Poland

TO EXPORT CANNED LAMPREYS

A Polish fishery cooperative has begun to produce canned lampreys for export via the state-owned foreign trade firm "Animex." Lampreys are landed mostly in the lower section of the Vistula River. So far, they have been used principally to make a marinated product. ("Polish Maritime News," Dec. 1966.)



Greece

FROZEN FISH LANDINGS INCREASED IN 1966

The Greek Atlantic freezer-trawler fleet landed 26,637 metric tons of frozen fish in the first 11 months of 1966, compared to 23,918 tons in the 1965 period.

The Government has proposed setting up a State-controlled company to distribute frozen fish in domestic and foreign markets. Most private Greek firms fishing in the Atlantic would participate in the new distributing firm with the option of eventually taking

it over. The object is to improve distribution and avoid the excessive buildup of frozen fish supplies that has occurred in the past. The Government also hopes to expand eventually trawling operations in offshore waters.

Shrimp fishing in both the Persian Gulf and the North African area yielded disappointing catches in late 1966. However, Persian Gulf fishing improved in December 1966. A Greek firm engaged in shrimp fishing there is reported to have acquired two more shrimp trawlers. ("Alieia," Dec. 1966.)



Italy

EEC APPROVES 30,000-TON DUTY-FREE TUNA IMPORT QUOTA

Japanese frozen tuna organizations say the European Economic Community (EEC) has agreed to revise Italy's frozen tuna import tariff system. EEC will authorize an increase in the duty-free frozen tuna import quota from the present 14,000 metric tons to 30,000. However, EEC reportedly proposed that even within the 30,000-ton quota, duty be levied on frozen tuna bought at prices below the standard US\$340 a metric ton c.i.f. established by EEC. In this case, duty would be paid on the difference between the two prices.

At present, Italy permits frozen tuna imports from non-EEC countries free of duty up to 14,000 metric tons; she assesses an ad valorem duty of 0.5 percent from 14,000-45,000 tons, and 15 percent over 45,000 tons.

It is reported that Japan, at the Kennedy Round in Geneva, plans to oppose EEC's establishment of the price standard. If unsuccessful, she intends to seek removal of skipjack from the proposed tariff. Japan also plans to seek a tariff reduction on her canned tuna in oil exports to EEC countries, presently assessed a 25-percent ad valorem duty. ("Nihon Suisan Shimbun," Jan. 30; "Suisan Tsushin," Jan. 27, 1967.)



ASIA

Japan

PURSE-SEINE TUNA FISHERY GAINS ATTENTION

Japanese distant-water purse-seine fishing is attracting wider attention as a way of improving tuna fishery management. It had been overshadowed by the growing high-seas trawl fishery. Some suggest that purse-seine operators should organize an overseas association to smooth operations.

At present distant-water purse seining is conducted experimentally in the eastern Atlantic off West Africa and in the South Pacific. The Atlantic operations began in late 1964 when Nichiro Fishing Company applied for a license to fish in the Gulf of Guinea with the 140-ton vessel "Kuroshio Maru" led by the 1,500-ton mothership "Chichibu Maru." The firm reportedly lost money during the first 2 years. But in summer 1966, when it added 2 more efficient two-boat seiners, "Hakuryu Maru" and "Seisho Maru," it managed to pull out of the red.

Taiyo Began Purse Seining in 1964

In the South Pacific, in spring 1964, Taiyo Fishing Company conducted the first purse-seine fishing with the power block-operated "Kenyo Maru" of 240 gross tons. Later, more seiners entered the fishery. Now it is reported that 6 vessels are engaged in the purse-seine fishery. Taiyo is building a 275-ton vessel to replace the Kenyo Maru. Another firm has ordered a large 350-ton seiner for the South Pacific.

The growing interest in this fishery is attributed to the average production per crew member on a purse seiner of around 60 metric tons per trip. This compares with 40 tons on a pole-and-line skipjack vessel and 18 tons on a long-liner. However, since the seine-caught fish are predominantly skipjack, there is a need to create greater market demand for them. Moreover, purse-seine operators face unstable fishing conditions--with catches some days running from zero to as high as 200 tons. So, unless fishing operation is coordinated with transportation by carriers, the owners will lose money. ("Suisan Keizai Shimbun," Jan. 16, 1967, and other sources.)

TUNA PURSE SEINING OFF NORTHWEST AFRICA IMPROVES

Purse-seine fishing for tuna by one Japanese company's 3 seiners off West Africa picked up in December 1966 after a slight slowdown in November. Catches were mostly large yellowfin, with landings of up to 300 tons per vessel in 2 days of fishing.

Most catches were exported to the U. S. because of weakening demand in Italy. Mid-December price of gilled and gutted yellowfin for delivery to West African ports was US\$440 a short ton, down \$10-15 a ton from November. ("Suisan Tsushin," Dec. 16, 1966.)

TUNA FLEET BASED IN AMERICAN SAMOA IS REDUCED

The Japanese tuna fleet based in American Samoa on January 1, 1967, totaled 25 vessels, a decline of 10 from early December 1966. In contrast, the Formosan fleet based there increased from 64 to 68 vessels, and the South Korean from 55 to 56 during the same period.

The sharply reduced fishing operations and higher operating costs of Japanese vessels, compared to the other two, are said to have considerably weakened Japan's position in negotiating tuna prices with U. S. packers in Samoa. ("Katsuo-maguro Tsushin," Jan. 18, 1967.)

SCIENTIST SUGGESTS ARTIFICIAL PROPAGATION OF TUNA

A Japanese tuna researcher suggests that tuna can be artificially propagated as a means of increasing production. Dr. Motoo Inoue, Fishery Research Laboratory, Tokai University, claims that tuna can be artificially bred, nurtured, and released. He urges Japan to take the initiative in launching a tuna hatchery project with international cooperation in the equatorial Pacific where atolls, reefs, and lagoons could be utilized as hatcheries and sea farms. (Private correspondence.)

Japan (Contd.):

ADOPTS 80,000-TON FROZEN TUNA QUOTA TO U. S.-CANADA

The Japan Frozen Tuna Producers Association adopted at its January 25 meeting a direct export quota totaling 80,000 short tons of frozen tuna for the United States and Canada in business year 1967 (April 1967-March 1968). The 80,000-ton quota consists of albacore 35,000 tons, yellowfin 35,000 tons, and 10,000 tons reserved. Of the 35,000-ton quota, 32,600 tons are to be allotted to exporters on the basis of performance over the past three years, 12,250 tons are unassigned, and 150 tons are for newly authorized firms. The BY 1967 quota was 5,000 tons over 1966's quota based on a 10-percent increase in U. S. canned tuna consumption in 1966. ("Suisan Keizai Shimbun," Feb. 1, "Suisancho Nippo," Jan. 27, 1967.)

FROZEN TUNA EXPORT QUOTAS SET FOR BY 1967

The Japanese Frozen Foods Exporters Association agreed at the January 26 meeting ("Suisan Tsushin," Jan. 28, 1967) to set the following frozen tuna export quotas for business year 1967 (April 1967-March 1968):

Area I (U.S. -Canada)	- 110,000 short tons
Area II (Europe and Other Countries)	- 70,000 metric tons
Overseas Bases:	
American Samoa	- 25,000 short tons
Espirito Santo	- 6,000 " "
Fiji Island	- 9,000 " "
Penang (Malaysia)	- 6,000 " "
Saint Martin (West Indies)	- 2,000 " "

FROZEN TUNA EXPORT PRICES WEAKEN

Despite declining tuna catches, prices of Japanese frozen tuna exports in late January 1967 continued to weaken, with U. S. packers showing no buying interest. One offer for US\$520 a short ton c.i.f. was received from a U. S. packer for frozen round albacore for direct export to the United States. But other than that, no new bids were received from U. S. buyers. In contrast, exvessel albacore prices in Japan have been rising gradually and were quoted in late January at 189 yen a kilogram (\$476 a short ton).

Prices of yellowfin (gilled and gutted) for direct export to the U. S. reportedly declined

to \$470 a short ton c.i.f., but even at that price U. S. packers were not showing much interest.

Atlantic-caught albacore prices were reported below \$440 a short ton f.o.b. Las Palmas, down more than \$60 a ton from the high of \$500 a ton reached in September 1966. ("Suisan Tsushin," Jan. 24, 1967.)

FROZEN TUNA EXPORT VALIDATIONS ROSE IN 1966

Frozen and fresh tuna validated for export in November 1966 totaled 19,867 metric tons--over 2½ times more than the 1965 exports of 7,687 metric tons. Exports for April-November 1966 were 127,565 metric tons, compared with 116,565 tons for the 1965 period. ("Suisan Tsushin," Dec. 28; "Suisancho Nippo," Dec. 23, 1966.)

Frozen and Fresh Tuna Export Validations, November 1966				
	U. S.-Canada	Overseas Bases	Other Countries	Total
Tuna:	... (Short Tons) 1/.	... (Metric Tons).		
Albacore 2/	6,988	4,024	299	10,289
Yellowfin 3/	3,643	808	2,386	6,425
Big-eyed 3/	67	367	789	1,183
Skipjack 2/	1,339	-	249	1,463
Bluefin 3/	-	-	3	3
Tuna loins	555	-	-	504
Total	12,592	5,199	3,726	19,867

Frozen and Fresh Tuna Exports, Apr.-Nov. 1966, with Comparisons				
	U. S.-Canada	Overseas Bases	Other Countries	Total
Tuna:	... (Short Tons) 1/.	... (Metric Tons).		
Albacore 2/	36,846	11,661	3,145	47,151
Yellowfin 3/	29,354	5,714	25,976	57,789
Big-eyed 3/	1,745	1,186	7,495	10,151
Skipjack 2/	6,428	9	1,727	7,567
Bluefin 3/	-	-	1,321	1,321
Tuna loins	3,953	-	-	3,586
Total	78,326	18,570	39,662	127,565
Apr.-Nov. 1965	80,743	7,898	36,100	16,565

1/To convert short ton to metric ton, multiply by 0.9072.

2/Round fish.

3/Gilled and gutted, dressed, and fillets.

Japan (Contd.):

BOAT-CARRYING TUNA MOTHERSHIP
TO FISH IN INDIAN OCEAN

When the 2,800-gross-ton Japanese vessel "Kaigata Maru No. 58," serving as a carrier in the Antarctic whaling operation, returns to Japan in March, she will be converted to a six-boat-carrying tuna mothership. The owners are preparing to send the vessel to the Indian Ocean in April under a two-trip-a-year operational plan. Production goal is over 500 million yen (US\$1.4 million) worth of fish in the first year. ("Katsuo-maguro Tsushin," Jan. 9, 1967.)

* * *

TUNA CATCHES ARE DECLINING IN
ATLANTIC AND INDIAN OCEANS

Japanese tuna catches in the Atlantic and Indian Oceans began to decline in mid-January. In the Atlantic, fishing fell off in all grounds except north of Saint Martin Island (West Indies, east of Virgin Islands) where albacore catches of around three tons a day were being landed. Off Brazil, where most Japanese long-liners were operating daily, catches averaged 2-2.5 tons of fish, mainly albacore.

In the Indian Ocean, where over 100 tuna vessels are fishing, landings averaged about 2 tons of fish a day. Vessels working the western grounds have nearly all switched from albacore to yellowfin. ("Suisan Tsushin," Jan. 24, 1967.)

* * *

ADOPT 1967 EXPORT QUOTAS FOR
SWORDFISH AND TUNA LOINS

The Japan Frozen Foods Exporters Association adopted an 8,000-ton quota for tuna loin exports to the U. S. in business year (BY) 1967 (April 1967-March 1968). This year's quota was reduced 1,000 tons from last year's because actual exports for BY 1966 were expected to fall considerably below the established quota.

The Association's swordfish committee decided on a 5,500-ton swordfish quota for BY 1967 exports to the U. S. ("Suisancho Nippo," Jan. 23, 1967.)

* * *

VESSEL OWNERS TO HIRE OKINAWANS

To alleviate a serious labor shortage confronting fishing vessel owners, the Yaizu Fishery Cooperative Association was scheduled to dispatch on January 19 three Association members to Okinawa on an 8-day recruiting trip. The team was to visit local high schools and junior high schools to interview graduating students interested in working aboard fishing vessels. The Association hoped to recruit about 80 students. ("Minato Shimbun," Jan. 17, 1967.)

* * *

ANTARCTIC WHALE CATCH
NEARS THIRD OF QUOTA

Japan's 3 whaling firms (4 fleets in the Antarctic) reported as of January 5 a catch of 448 blue-whale units since the Antarctic whaling season opened December 12, 1966. The catch of sperm whales was 297, producing 1,514 tons of sperm oil. Japan's quota of blue-whale units this season is 1,633. It was 2,340 units last season. ("Yomiuri," Jan. 9, 1967.)

* * *

ATLANTIC TRAWL FISHERY IS GOOD

There were about 70 Japanese distant-water trawlers in the Atlantic Ocean in early January 1967--about 60 of them concentrated off northwest Africa fishing primarily for octopus. The octopus fishing season, which begins around November, was at its height; good fishing was reported. Catches by 1,500-ton trawlers were 10-15 metric tons a day. After the octopus season ends in March, the vessels will switch to squid.

Trawlers off Africa's southern coast, where catches consist mostly of "merluza" (hake) and sea bream, were having good fishing. Daily landings were over 20 tons of merluza and 10-12 tons of sea bream.

The Atlantic trawl catch in 1967 is expected to reach 200,000 metric tons. Production in 1966 was 180,000 tons (estimate); in 1965, 160,000 tons; in 1964, 122,000 tons. ("Minato Shimbun," Jan. 5 & 6, 1967.)

* * *

Japan (Contd.):

OWNERS OF SEIZED VESSELS
WANT TOKYO TO REPAY FINES

Japanese fishery circles, disturbed by mounting seizures of vessels in recent years by countries claiming new territorial sea limits or exclusive fishing zones, are asking the Government to provide relief to vessel owners fined by such countries. These spokesmen say that because Tokyo adheres to the 3-mile principle and does not recognize exclusive fishing zones established unilaterally, it should compensate owners for fines imposed on their vessels stopped outside the 3-mile limit.

The Fishing Vessel Insurance Law of Japan compensates for vessel damages in war, rebellion, confiscation, seizure, detention, surface and underwater explosions; but it does not allow reimbursement of fines. Some industry members say the Government should enact a law similar to the U. S. Fishermen's Protective Act. ("Minato Shimbun," Jan. 17, 1967.)

MACKEREL FISHERMEN FIGHT
OVER TYPE OF GEAR

The mackerel fishing dispute between the pole-and-line fishermen and surrounding-net operators on the Pacific coast of Choshi, east of Tokyo, continued unresolved through December despite mediation efforts of the Fisheries Agency. It had begun early in the month. The flare-up occurred when the two factions accused each other of violating the fishing adjustment agreement concluded in spring 1966. At one time, the dispute threatened to erupt into violence, with 250 pole-and-line mackerel boats protesting in Tokyo Bay and fishermen holding rallies. The pole-and-line vessel owners contend that net fishing is ravaging the resource, causing extreme hardship for their fishermen, and are demanding that the Government act to prohibit nets in the local mackerel fishery. ("Suisan Keizai Shimbun," Dec. 23, 1966, and other sources.)

FIRM WILL BUILD TWO
4,000-TON STERN TRAWLERS

Two 4,000-gross-ton stern trawlers, reported the largest of their kind in Japan, are

scheduled to be built starting in mid-February at a Japanese shipyard for Nihon Suisan Fishing Company at a total cost of US\$5 million. Completion is set for late December 1967 for the first vessel, and late February 1968 for the second. That firm also plans to build a 500-ton trawler this year at an estimated cost of \$722,222. Construction was scheduled to begin in early February and completion set for late July. ("Minato Shimbun," Jan. 1967.)

FISHERMEN SEEK TO LONG LINE
IN GULF OF ALASKA

The Japanese Northern Water Longline and Gillnet Fishery Council has proposed that the Government extend the northern water operational area from the Bering Sea region (north of 50° N. latitude between 170° E.-175° W. longitudes) to the Gulf of Alaska. The proposal was adopted at a January 13, 1967, meeting to develop plans for 1967.

On January 14, the proposal was presented to the Agriculture and Forestry Ministry. The Council has 16 firms operating 19 catcher vessels in the Bering Sea bottomfish fishery.

The Council maintains that its vessels, which primarily fish for sablefish, operate gear at depths beyond 400 meters (200 fathoms) and, therefore, there is virtually no possibility that halibut would be taken from the Gulf as feared by the U. S. and Canada. ("Suisancho Nippo," Jan. 16; "Shin Suisan Shimbun Sokuho," Jan. 14, 1967.)

PRODUCES FISH BLOCKS FOR U. S.

Within the past year, Japan has begun to produce frozen blocks of fillets processed from South Atlantic hake or whiting for export to the U. S. This new product could have future significance in the Japanese export trade or domestic markets.

In 1959, Japan began to trawl commercially off the west coast of Africa. This fishery grew rapidly: production in 1964 was 122,000 metric tons, 160,000 tons in 1965, and 180,000 tons in 1966. Initially, domestic demand for squid, octopus, and sea bream from African waters almost supported the operation of the vessels.

Japan (Contd.):

The method of processing hake into frozen blocks of fillets is that used by other countries. In the north Atlantic, in 1963, Taiyo Fishery Company conducted a trial processing of filleted cod, haddock, and ocean perch into frozen fish blocks. At present, Taiyo is the only Japanese company producing fish blocks aboard factoryships at sea.

Note: This new leaflet contains a diagram illustrating the method of processing hake into fish blocks at sea. It is FFL-110--"PRODUCTION OF FISH BLOCKS IN JAPAN"--available free from the Branch of Foreign Fisheries, BCF, Room 8015, U.S. Department of the Interior, Washington, D. C. 20240.

FISH MEAL PRODUCTION BY NEW PLANT IS 1,000 TONS

In 1966, the largest fish meal plant in Kyushu, Japan, processed fish meal and fish solubles totaling 1,491 metric tons valued at 54.8 million yen (US\$152,000). The plant was built by the Makurazaki Fish Products Processors Cooperative Association in December 1965 at Makurazaki, Kagoshima Prefecture.

Fish meal comprised 963 tons worth \$112,305, fish solubles 392 tons worth \$24,916, and fish oil 136 tons worth \$14,945. The plant processes scraps from "katsubushi" (dried skipjack loin) establishments in Kyushu. ("Minato Shimbun," Jan. 6, 1967.)

1966 LANDINGS AT YAIZU REACHED ALL-TIME HIGH IN VALUE

Fish landings in 1966 at the major Japanese fishing port of Yaizu totaled 169,032 metric tons valued at 22,613,460,000 yen (US\$62.8 million). This was a substantial increase over 1965 receipts that totaled 149,168 tons worth 17,724,414,000 yen (\$49.2 million). The value of landings was the highest for Yaizu and also topped other ports.

While albacore receipts at Yaizu declined by 9,279 tons compared with 1965, the record value of landings was attributed to the increase in landings of other species--skipjack tuna (up 25,276 tons over 1965), mackerel (up 3,566 tons), and bluefin tuna, including yellowfin and big-eyed (up 122 tons). Another factor was the better quality fish brought back because of improved freezing systems

on vessels and the resultant higher prices. ("Minato Shimbun," Jan. 6, 1967.)

BAIT SAURY PRICES UP

Prices of bait saury for the tuna long-line fishery rose sharply in early December 1966 and were expected to reach a high of 170-180 yen per kilogram (US\$428-454 a short ton) exvessel. Tuna vessel owners were concerned over the rising cost of this extensively used bait but hoped to obtain sufficient supply for 1967.

Japanese saury production in 1966, on December 15, was 235,000 metric tons, a slight increase over 1965 landings of 227,000 tons. Because the fish harvested were larger, much production was sold to the fresh fish market at around 150 yen per kilogram (\$378 a short ton) exvessel. ("Shin Suisan Shimbun Sokuho," Dec. 17, 1966, and other sources.)

HERRING ROE PRICES SKYROCKET

The tremendous year-end demand in Japan for herring roe, a traditional New Year's delicacy, drove prices up to fantastic levels. In Tokyo's retail market, dried herring roe sold for 1,500-2,000 yen per 100 grams (US\$18.94-25.25 a pound) and herring roe in brine 400-550 yen per 100 grams (\$5.05-6.94 a pound). Although 1966 prices dropped 30-40 percent below 1965 prices due to good domestic herring production and increased imports, the product is still beyond the reach of the average consumer.

Herring roe imports into Japan, Government controlled, are handled by about 200 trading firms, and their number is increasing. Because some firms may even form dummy companies to establish import rights, the Government intends to limit drastically the issuance of import licenses in 1967 to about 30 firms in 1967, based on past performance. ("Suisancho Nippo," Dec. 22; "Nihon Suisan Shimbun," Dec. 21, 1966.)

TO BUY MORE SHRIMP FROM PAKISTAN

A team from Marubeni-Iida, Nissho Trading Co., Osaka Branch Japan Export-Import

Japan (Contd.):

Bank, and the Ministry of International Trade and Industry (MITI) will go to Pakistan to study ways of promoting the purchase of primary products in order to overcome the latter's present trade imbalance with Japan. Since shrimp is a major fishery product and a large resource, it will receive considerable attention.

In 1965, Japan purchased 206 metric tons of shrimp from Pakistan worth about US\$354,000. In first-half 1966, purchases amounted to about \$223,000. With the growing domestic demand, increased imports of quality shrimp will find a good market. (Fishery Attaché, U. S. Embassy, Tokyo, Jan. 25, 1967.)

* * *

SENDS SURVEY TEAM TO
PERU AND MEXICO

The Japan Fisheries Resource Conservation Association sent two members to Peru and Mexico on January 21 for a one-month fishery survey. In Peru, they will study fishery conservation programs, and the anchovy fishing and fish meal industry to improve Japan's fish food supply for cultured fish. In Mexico, they will study the shrimp fishing and processing industry, government policy, and research programs to gain knowledge on ways to promote Japan's shrimp fishery development. ("Suisan Keizai Shimbun," Jan. 11, 1967.)

* * *

HELPS DEVELOP FISHERIES
IN PERU AND ECUADOR

The Japanese Ministry of Construction has established an International Construction Technological Association to help develop fisheries in Peru and Ecuador. A 5-member team left January 6, 1967, to study construction of a fishery terminal in Peru and the export of canned fish from Ecuador.

Although Peru is the world's No. 1 fishing nation, the Association noted that present production is almost entirely fish meal. Peru now plans to develop actively tuna and other resources for food. Three new fishery terminals will be built: Paita (or Boyovan), Callao, and Mollendo--each with cold-storage

and processing facilities to provide fish for distribution to interior towns and villages. In May 1966, the fisheries firm Promotora de Pesca was established to manage the terminals.

Ecuador To Develop Canned Tuna

In Ecuador, plans call for developing canned tuna for export; they will develop the fisheries and prevent seasonal unemployment. The Atlantic Community Development for Latin America will help build the canneries and develop export markets.

The Japanese study is subsidized by the Japanese Ministry of International Trade and Industry (MITI) and will take 47 days. The Association believes that Latin American fisheries will grow. It wants to give technical assistance--but also to find markets for Japanese machinery and material. (Fishery Attaché, U. S. Embassy, Tokyo, Jan. 12, 1967.)

* * *

SECOND FIRM EXPLORES FOR
SHRIMP OFF NORTHERN AUSTRALIA

The Nihon Suisan firm plans shrimp explorations north of Australia in March. It will use its stern trawler "Asama Maru" (1,000 gross tons) now harvesting mainly sea bream off northeast Australia. If the operation proves successful, Nihon Suisan plans to enter into a joint shrimp venture with an Australian firm.

In early summer 1966, another Japanese fishery firm, Kyokuyo Hoge, licensed by the Fisheries Agency to conduct experimental shrimp fishing in the Gulf of Carpentaria, northern Australia, showed good results. ("Minato Shimbun," Jan. 28, 1967.)

* * *

JAPAN-U. S. FISHERY VENTURE
PLANNED IN ALASKA

The Japanese fishery firm Hoko Suisan and trading firm Marubeni Iida are reported seeking the Japanese Fisheries Agency's approval to enter into a joint venture with the American TAD Fishing Company of Seward, Alaska. The joint company is scheduled to be formed in April 1967 with capital of US\$500,000--the Japanese firms contributing 49 percent and the U. S. partner 51 percent. The proposed enterprise will engage primarily in exporting locally caught shrimp and

Japan (Contd.):

king crab to Japan, with plans to add halibut and salmon to the export list. One-third of the products will be marketed locally. ("Suisancho Nippo," Jan. 27, 1967.)



Taiwan

PLANS TO EXPAND TUNA FISHERY

The Formosan (Taiwanese) tuna fishing industry, which has grown rapidly in recent years, may establish overseas bases this year to serve its expanding distant-water tuna fleet. The fleet now numbers over 100 vessels. The Formosan tuna fishermen have been using Japanese bases but are reported dissatisfied and eager to have their own.

Indications are that Formosa will establish 1 or 2 fishing bases in the Indian Ocean in 1967 with capital coming mostly from Chinese merchants in southeast Asia. Japanese financial and technical assistance also may be sought.

Central Buying Agency May Be Set Up

The tuna industry also is reported planning, with government support, to establish a centralized gear and bait purchasing agency. Japanese trading firms providing supplies to Formosan vessel owners under cooperative arrangements would lose good trading items. They may even find themselves in a bad bargaining position.

Formosa, like South Korea, exports most of her tuna catches to the U. S. Japanese observers view the growing emphasis on Formosa's tuna fishery as strengthening the latter's position in the international tuna market. They also fear that this trend will have a tremendous impact on Japan and may, in 2 years, dislocate the Japanese tuna industry. ("Minato Shimibun," Jan. 20, 1967.)



Republic of Korea

SELECTS PRIORITIES FOR NEXT 5 YEARS

The government of South Korea has selected 20 priority projects it hopes to carry out during the next 5 years with a US\$300 million development loan from AID. The loan includes \$16 million for fishery development. The loan will be added to West European loans and Japanese reparations to modernize Korea's coastal fisheries and expand her high-seas fishing.

In 1966, Japanese reparations used for fisheries amounted to \$9.5 million: \$5.6 million for processing facilities and ports, \$3.7 million for vessel construction and purchase of gear, and \$0.2 million for machinery and parts.

To promote exports of fishery products, South Korean Export Promotion Committee recommended extension of export credits from 3 to 6 months--and importation of tin cans until domestic output is assured at reasonable prices. ("Korean Business Review," vol. 1, no. 8, Dec. 1966.)



Philippines

TO EXPAND FISHPOND INDUSTRY

To increase the production of fish, the No. 2 food staple, President Marcos of the Philippines has moved to open 700,000 hectares of public domain to fishpond development.

On January 17, 1967, the President appointed a permanent committee to study and expedite the opening of these lands to private developers. Committee members are: the Secretary of Agriculture and Natural Resources, Chairman; the Chairman of the Development Bank, Vice Chairman; Undersecretary of Agriculture for Natural Resources, and the directors of the Bureaus of Fisheries, Forestry and Lands. (U. S. Embassy, Manila, Jan. 22, 1967.)



Australia

TASMANIA LIMITS SPINY LOBSTER FISHING LICENSES

Pending the results of an economic survey now underway of the State's spiny lobster fishing industry, the Tasmanian Government has limited commercial spiny lobster pot licenses to a maximum of 420. The Minister for Fisheries reported 388 boats licensed to take spiny lobster and others recommended for licensing. With more boats in the industry and others trying to enter, a survey of trends became necessary.

Statistics have shown a decline in the number and weight (lbs.) of spiny lobster per pot lift.

At present, the number of pots a licensed boat can carry is limited and there are sound reasons for limiting the number of boats entering the fishery.

Fishermen Accept Plan for Higher Fees

The Professional Fishermen's Association (PFA) had accepted proposals for higher licensing fees in 1967 and it was proposed to channel this money into research on the State's fisheries. In 1965, PGA urged the Government to freeze the number of licenses for spiny lobster pots.

Present controls do not apply to other forms of fishing and there is no restriction on the number of boats taking shark, finfish and pelagic fish, scallops, and abalone. However, certain areas were closed to shark and scallop fishing.

Future licenses would be restricted to a master fisherman operating one boat licensed in his name. The qualifications for the master license have been strengthened. However, a ceiling would remain on the maximum number of licenses issued.

The Minister anticipated completion of the economic survey in the first half of 1967. The Government's position on future licenses would be determined then. He said it was the Fisheries Department's responsibility to insure the full exploitation of the resource at a maximum sustainable catch. It was equally

important for the industry to function on a sound economic basis. ("Australian Fisheries Newsletter," Dec. 1966.)



New Zealand

FISH MEAL PLANTS PLANNED

Plans for a US\$1,430,000 fish meal plant that could be operating in the Bay of Islands, in the North Island of New Zealand, before the end of 1968 have been put before the Government.

The plant could process 2,000 tons of fish a day for meal and oil, but initial plans are for half this quantity. This proposal by a private firm is for 3 other plants to be established progressively over a period of 6 years at 3 other places--tentatively suggested at Gisborne, Nelson, and the west coast of the South Island.

Each factory would be highly mechanized and be built where they would be no threat to health or scenic beauty. ("Fishing News International," Jan. 1967.)



New Guinea

JAPANESE-AUSTRALIAN FIRM TO FISH SHRIMP

The Japanese Kinkai Hogeï Fishing Company, in a joint venture with an Australian trading company, was planning to dispatch a remodeled 350-gross-ton freezer vessel to New Guinea in late February to explore the coastal waters for shrimp, spiny lobster, and sea bass. The Japanese firm plans to ship the catches home, but it was also considering exporting to the U. S. shrimp and lobster--if they are available. Fishing season for sea bass, reported abundant, peaks around May-June. ("Suisan Tsushin," Jan. 13, 1967.)



AFRICA

South Africa

PELAGIC FISH CATCH DROPPED IN 1966

The total pelagic fish catch in South African waters for the 1966 season dropped from the 529,035 tons in 1965 to 394,517 tons. During 1966, there was an even greater reliance on anchovy--43.9 percent of the total catch. This compared with 36.8 percent in 1965, and 21.6 percent in 1964, when anchovy were first caught as a substitute for the declining Cape pilchard catches.

The situation is further aggravated by the fact that anchovy, although an acceptable substitute, yields considerably less oil than pilchard. The 1966 fish oil yield was estimated to average 7 gallons per ton, as against 11 gallons in 1965. Fish body oil sales, moreover, recently have been yielding 25 percent less than in 1966; this is attributable mainly to heavy production in Iceland.

Meanwhile, prices for fish meal have declined steeply as a result of Peru's active participation in pelagic fishing after her 3-month closed season during 1966. Also, South and South West Africa's position in the American spiny lobster market is facing competition from Brazil, Thailand, and Japan. This has not yet had much effect, however, on the income derived from exports of the local product. ("Barclay's Trade Review," Johannesburg, Dec. 1966.)



Ivory Coast

FISH CATCH DROPPED IN 1966

Abidjan's 70-vessel commercial fishing fleet landed 33,945 metric tons of fish and shellfish in the first 10 months of 1966--down 4.3 percent from the 1965 period. This decrease resulted largely from the poor sardinella catches in the first 4 months.

Administrative delays held up the call for bids to construct the second quay at Abidjan's fishing port. It now is expected to be advertised early in 1968. Latest reports indicate that the new 3,000-ton fish freezing plant may be started in April 1967 and completed in

March 1968. Its design and specifications have been under review by an American consulting engineer. (Fisheries Attaché, U. S. Embassy, Abidjan, Jan. 25, 1967.)



Mauritania

SEIZES JAPANESE TRAWLER

The 999-gross-ton Japanese trawler "Daishun Maru," operating off northwest Africa near Cape Blanco, Mauritania, was seized by the Mauritanian Coast Guard January 3, 1967, for fishing inside the 12-mile exclusive fishing zone. The Japanese Foreign Ministry protested and was seeking immediate release of the vessel.

This is the second Japanese vessel seized by Mauritania. In January 1966, the stern trawler "Taiyo Maru No. 71" (1,500 gross tons) was captured and fined the equivalent of 6 million yen (US\$16,666), which was later reduced to 1.5 million yen (\$4,166). ("Minato Shimbun," Jan. 8, 1967.)



Nigeria

CLAIMS 12-MILE TERRITORIAL WATERS

A decree would soon extend Nigeria's territorial waters from 3 to 12 miles "for all purposes," the Federal Military Government (FMG) said on January 3, 1967.

Two reasons were given: (1) the Ministry of Agriculture and Natural Resources is concerned about fishing trawlers operating off Nigeria's coast beyond the present 3-mile limit. In August 1966, the captain of Nigeria's research vessel "found about 17 Soviet trawlers fishing from 6 to 12 miles off our coast within a distance of 20 miles of either of the Bonny Rivers." These vessels, the FMG statement added, were not registered in Nigeria. The Government believes "that each regional government is at liberty to legislate in respect of fishing and fisheries within the territorial waters adjacent to its coast." If that is done, it will "be possible to ensure

Nigeria (Contd.):

that only Nigerian registered fishing vessels" will be permitted to fish the waters adjacent to Nigeria.

(2) Extending Nigeria's territorial waters would permit intensification of antismuggling operations. Now smugglers enjoy some immunity because of the 3-mile limit. (U. S. Embassy, Lagos, Jan. 5, 1967.)



Senegal

SOVIETS SUPPLY TUNA VESSELS

Representatives of the Soviet firm "Promachexport" contracted with the Government of Senegal to furnish the Société Sénégalaise de Pêche 10 refrigerated tuna fishing vessels worth 882,000,000 CFA francs (US\$3.6 million).

This is the first Soviet step to implement its loan agreement of March 22, 1965, of 1,650,000,000 CFA francs (\$6.73 million) to develop the Senegalese fishing industry.

The press reported that the vessels, over 100 feet long, will be constructed in Kiev and powered by French motors. They are scheduled for delivery to Dakar in 1968, 1969, and 1970. (U. S. Embassy, Dakar, Jan. 27, 1967.)



Foreign Fishing Off U. S. Coasts, January 1967

OFF ALASKA

Soviet: During January, Soviet fishing and support vessels increased from slightly over 100 to about 130.

Early in the month about 30 fishing and support vessels fished and processed Pacific ocean perch in the eastern part of the Gulf of Alaska off Yakutat. By mid-month, that fleet increased to over 45 vessels, concentrating off southeastern Alaska; by month's end, it was down to the initial 30, and switched to the Fairweather fishing grounds.

Ocean perch fishing in the central Gulf was limited: 3 trawlers operated on Albatross Bank during mid-month, and only 1 remained at month's end. One trawler fished near Chirikof Island in late January. The perch fleet between Shumagin Islands and Unimak Pass in the western Gulf increased from 7 to 14 trawlers and 3 support vessels during the first 2 weeks, then decreased to 6 trawlers and 1 support vessel by month's end. The decrease in vessels fishing for perch in the Gulf of Alaska during January probably resulted from a shift to the flounder fishery in the eastern Bering Sea.

Shrimp fishing on the Continental Shelf surrounding the Shumagin Islands continued at high level throughout the month. The trawlers increased from 18 to 21, and their catches continued to be processed by a canning factoryship.

The winter herring fishery north of the Pribilof Islands apparently has failed to develop for the second consecutive year. Only 5 trawlers and 3 support vessels are known to have been active during January.

The eastern Bering Sea flounder fishery continued to expand in January with a fleet of about 50 trawlers and 20 support vessels active by month's end. Most vessels fished just north of Unimak Island, but in late January a small part of the fleet moved north toward Cape Newenham.

Japanese: The number of vessels fishing off Alaska remained at 18 throughout January.

In early January, Japanese ocean perch operations off Alaska were conducted by one factory trawler, the "Kirishima Maru" off Southeastern Alaska, and by the factory trawlers "Zuiyo Maru No. 2" and "Ryuyo Maru" and one reefer south of Fox Islands in the eastern Aleutians. By mid-month, operations in both areas had ended. The perch fishery on Albatross Bank resumed about mid-month and, by month's end, the factory trawlers "Yutaka Maru," "Ryuyo Maru," and "Daishin Maru No. 12" were active.

In early January, the Japanese Alaska pollock fishery north of Fox Islands was conducted by the factoryship "Chichibu Maru" accompanied by about 8 trawlers and by the factory trawlers "Aso Maru" and "Tenyo Maru No. 3" (and her accompanying trawler).

About mid-month, those vessels were joined by the factoryship "Soyo Maru" and the factory trawler Zuiyo Maru No. 2. It is possible that the factoryship arriving about mid-month was accompanied by a fleet of trawlers, or she may have served as a support vessel for trawlers already active.

Two Japanese long-line vessels fished for sablefish off the coast of Southeastern Alaska during the first week of January. The number decreased to one (the "Tenyo Maru No. 18") the second week. It is believed operations ended in mid- or late January.

OFF PACIFIC NORTHWEST (Washington and Oregon)

Soviet: During January, Soviet vessels were limited to exploratory fishing. Only 3 stern factory trawlers and 5 side trawlers were sighted. The only concentration of vessels was seen on January 31: 4 side trawlers off Oregon coast. Three were traveling northward; the fourth appeared to be fishing. In prior weeks, only one Soviet vessel was sighted during weekly surveillance patrols.

A medium freezer side trawler (SRTM-432) left Vladivostok late in November 1966 and arrived off the U. S. Pacific Northwest coast on December 17, 1966. On December 20, she was sighted by a BCF foreign fishing surveillance patrol 25 miles west of Umpqua Light (near Newport, Oreg.). The vessel was seeking Pacific saury concentrations off U.S. coast for exploitation by the Soviet fishing fleet. Newport is in the general area where the Soviet scientists found the densest concentrations of saury during their 1965 research cruise. Irregular and smaller saury concentrations were found between 41° and 48° N. latitude.

The "Akademik Berg," flagship of the Soviet Pacific fishery research fleet returned from her Bering Sea cruise to Vladivostok in early January 1967. The aim of the 3-month cruise was to study deep-water (up to 1,000 meters) trawling for Pacific halibut and sablefish.

Japanese: Two stern trawlers (probably doing exploratory fishing) worked off Pacific Northwest during January. Their greatest effort was off Washington but, at the end of January, one vessel was sighted off Oregon.

OFF CALIFORNIA

Soviet: Most of the 20 Soviet fishing and support vessels reported off California in December 1966 left. During January 1967, only a few vessels fished in that area.

On Jan. 4, 1967, the U. S. Coast Guard conducted a foreign fishing surveillance flight with a California Fish and Game Commission officer aboard. Six Soviet fishing and support vessels were sighted and identified (see table).

The 2 "Maiakovskii"-class stern trawlers built in 1966 are on maiden voyages. The "Ulianovsk" is the oldest stern trawler and the only "Pushkin"-class vessel operating in the Pacific (23 other Pushkins operate in the Atlantic). The "Fedor Krainov" is the 150th Maiakovskii-class stern factory trawler constructed by the USSR in her shipyards.

The base ship "Arman" was located at the entrance to Santa Barbara Channel, between Point Conception and the St. Miguel Island, about 120 miles northwest of Los Angeles. Two large stern trawlers were lying close to base ship; a third stern trawler was observed about 15 miles south of Point Conception--she was the only one of the 6 sighted believed fishing. The remaining 2 stern trawlers were within a few miles of the base ship.

No Soviet vessels were sighted during the next 10 days but, by mid-January, 1 stern trawler (BMRT) was sighted. By month's end, 3 BMRTs were spotted: 2 about 15 miles off Half Moon Bay, and 1 about 19 miles off Farallon Islands. One vessel reportedly had rockfish on deck.

IN NORTHWEST ATLANTIC

Soviet: For the second consecutive month, no Soviet vessels fished on Georges Bank and

Name	Type	Class	Gross Tonnage	Built (Year)
Arman	Base Ship	Severodvinsk	10,000	Poland (1961)
Ulianovsk	Stern factory trawler	Pushkin	3,000	W. Germany (1956)
Amursk	Stern trawler	Maiakovskii	3,200	USSR (1961)
Suifun	"	"	"	" "
Fedor Krainov	"	"	"	" (1966)
Boris Gorinskii	"	"	"	" "

vicinity. During January 1966, about 50 fishing and support vessels were sighted there.

The best available information indicates that, during January, 30-40 vessels were concentrated on Grand Banks off Canada.

Late in January, U. S. fishermen reported several Soviet factory stern trawlers widely scattered south of Long Island, N. Y. (Hudson and Block Canyon), probably exploring.

There appears little doubt that the Soviets gradually will resume fishing in those areas.



DECLARE A DIVIDEND WITH SEAFOODS

Fish and shellfish offer a netful of dividends for the dieter because they are low in calories, but high in protein, minerals, and vitamins so essential to good nutrition. Dieting is easy with seafoods; they have so much to offer--endless variety in color, flavor, and texture; quick to fix; and real eating enjoyment. Seafoods are good any day of the week for any meal of the day.

North Pacific halibut steaks are topped with mushrooms, garden-fresh tomatoes, green peppers, onions, and a dash of pimiento and parsley. Over this pour a blend of white wine, lemon juice, and dill before baking to a golden brown. This unusual seafood treat, Hearty Halibut, is a dill dandy. Only 230 calories per serving, too!

HEARTY HALIBUT

2 pounds halibut steaks or other fish steaks, fresh or frozen	$\frac{1}{2}$ cup dry white wine
$\frac{2}{3}$ cup thinly sliced onion	2 tablespoons lemon juice
$\frac{1}{2}$ cups chopped fresh mushrooms	1 teaspoon salt
$\frac{1}{4}$ cup chopped tomato	
$\frac{1}{4}$ cup chopped green pepper	$\frac{1}{4}$ teaspoon dill weed
$\frac{1}{4}$ cup chopped parsley	$\frac{1}{8}$ teaspoon pepper
3 tablespoons chopped pimiento	Lemon wedges

Thaw frozen steaks. Cut into serving-size portions. Arrange onion in bottom of a greased baking dish, 12 x 8 x 2 inches. Place fish on top of onion. Combine remaining vegetables and spread over top of fish. Combine wine, lemon juice, and seasonings. Pour over vegetables. Bake in a moderate oven, 350° F., for 25 to 30 minutes or until fish flakes easily when tested with a fork. Serve with lemon wedges. Serves 6.



Hearty Halibut is from a new, 16-page, full-color, diet booklet just released by the United States Department of the Interior's Bureau of Commercial Fisheries. This publication, Seafood Slimmers, is available for 25¢ from the Superintendent of Documents, Washington, D. C. 20402.

ARTICLES

They found enough tuna to support commercial fishing. The plane was more effective than vessel in search for tuna schools.

AN AIRCRAFT AND VESSEL SURVEY OF SURFACE TUNA SCHOOLS IN THE LESSER ANTILLES

By Albert C. Jones* and Paul N. Sund**

Scientists of BCF's Tropical Atlantic Biological Laboratory studied the distribution of surface tuna schools in the waters adjacent to the Lesser Antilles Islands in February-April 1966. It was part of the laboratory's investigation of the biology and ecology of tunas in the tropical Atlantic Ocean.

Observations of the location, size, and species composition of the schools were made from BCF's research vessels "Undaunted" and "Geronimo"—and from an aircraft piloted by a professional tuna spotter. An important part of the study was to determine whether the ability to locate tuna schools could be increased by using a plane along with a research vessel. In this report, we compare the results obtained from the ship and the plane and discuss the efficiency of a survey in which both participate.

Aerial scouting for pelagic fish is used in many parts of the world (Iversen, 1963; Marty, 1965). Land-based aircraft are employed by the U. S. commercial tuna seining fleet to

scout for tuna schools and give detailed directions for setting purse seines (Broadhead and Marshall, 1961; Broadhead, 1962). Float planes and helicopters also have been used. Some vessel operators believe that assistance from aircraft is well worth the cost.

The ocean bordering the Antillean region, from Puerto Rico to Trinidad, was surveyed for surface tuna schools from the Undaunted between Feb. 26 and March 18, 1966 (figs. 1 and 2). Oceanographic data were collected at least three times each day. The vessel traveled about 80-90 nautical



Fig. 1 - BCF's Undaunted. (Photo by Jossi, TABL.)

*Fishery Biologist
**Oceanographer

Note: Contribution No. 38

Tropical Atlantic Biological Laboratory, BCF, Miami, Florida.

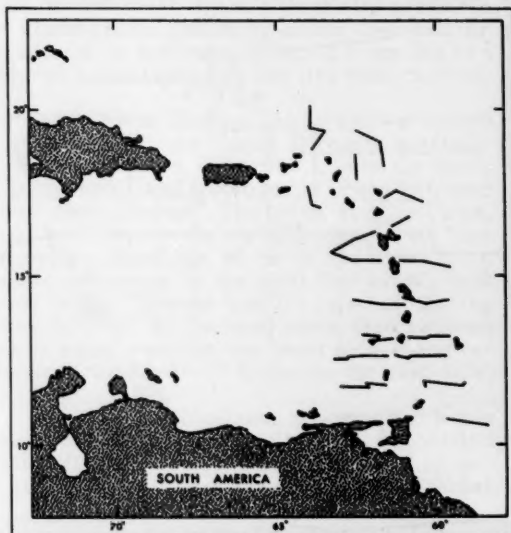


Fig. 2 - Lesser Antilles, showing daily cruise tracks of the Undaunted, February 26-March 18, 1966.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 783

miles each day along a straight transect line. Individual transect lines, representing successive days' surveys, were spaced at 45-60-mile intervals. The St. Vincent-Grenada portion of the area was again surveyed from



Fig. 3 - Cessna-180 used during tuna survey.

the Undaunted March 26 to April 1, and from the Geronimo, April 2 to 14. During these two periods, the transect lines were spaced at 15- to 20-mile intervals.

A Cessna-180 aircraft was operated along with the Undaunted from February 26 to March 28 (fig. 3.). The plane was flown in a pattern used for search and rescue work (U. S. Coast Guard, 1963) (fig. 4). While the vessel sailed a straight track, the plane flew along a parallel track pattern perpendicular to the vessel's. The lengths of the plane's transect lines were adjusted so that the plane crossed above the vessel at approximately $\frac{1}{2}$ -hour intervals. At average speeds of 10 knots for the vessel and 97 knots for the plane, it proved practical to fly 15 minutes (24.2 nautical miles) along the long leg of the flight pattern and 3.5 minutes (5.7 nautical

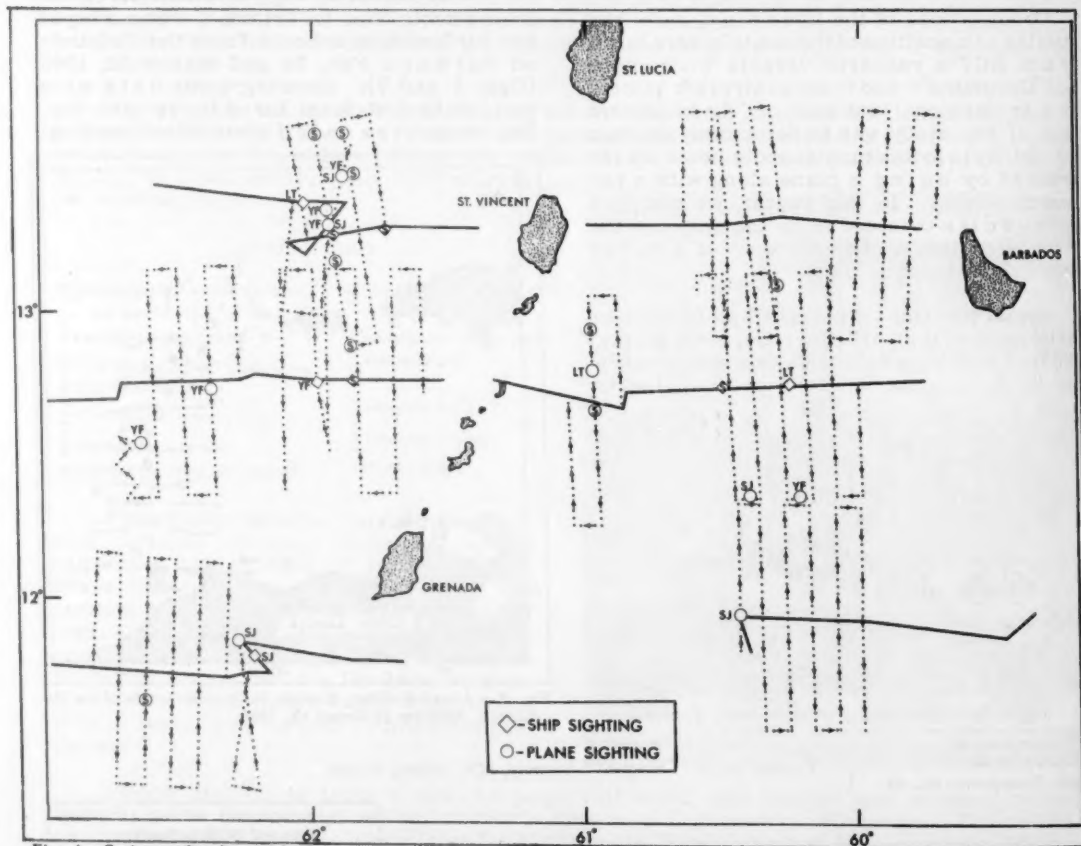


Fig. 4 - Cruise tracks of vessel (—) and plane (---) and sightings of pelagic fish schools, March 11-17, 1966. The 6 solid lines represent daily vessel tracks. YF, yellowfin school; SJ, skipjack school; LT, little tuna school; S, unidentified sighting.

miles) along the short leg. The plane usually flew at 1,500 feet.

DISTRIBUTION OF FISH AND BIRDS

No schools of tuna or other pelagic fishes were sighted from the ship or plane in 11 days of scouting (February 26-27, March 1-2, 4-10) from Puerto Rico to St. Lucia. Trolling yielded 5 little tuna (*Euthynnus alleteratus*) and one yellowfin tuna (*Thunnus albacares*); evidently, they were isolated individuals, not part of schools. Chumming and additional trolling failed to produce increased catches.

Larger numbers of fish were observed off the southern Lesser Antilles from St. Lucia to Trinidad. Ship and plane personnel sighted tuna and other pelagic fishes 27 times in 6 days of scouting (March 11-13, 15-17) (fig. 5). Yellowfin tuna or skipjack tuna (*Katsuwonus pelamis*) or both, were seen 20 times; unidentified species of tuna or billfishes were seen 7 times.

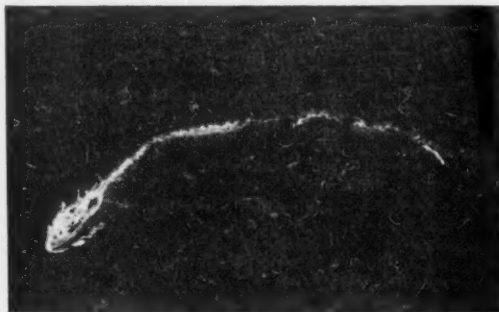


Fig. 5 - Photograph of mixed yellowfin and skipjack tuna school, estimated size 20 tons, and the Undaunted photographed from 1,300 feet altitude, March 15, 1966.

Sightings indicated a greater abundance of tunas on the west side of the southern Lesser Antilles than on the east side. Fourteen tuna schools were recorded on the west side of St. Vincent and Grenada on March 11, 15, and 16,

compared with six on the east side on March 12, 13, and 17 (fig. 4). Both yellowfin and skipjack tuna schools were seen in each area. Four sightings of unidentified pelagic fishes were made on the west side and three on the east side of the islands.

Later, west of St. Vincent and Grenada, 52 tuna schools were seen in 18 days (March 26-28; March 31-April 14). Skipjack tuna were most abundant in schools estimated at 15 to several hundred tons each. Yellowfin tuna were in schools estimated at 15 to 50 tons per school. Some schools contained a mixture of yellowfin and skipjack tunas. Size of skipjack ranged from 4 to 35 pounds and yellowfin 33 to 154 pounds. Identifications were made either from captured fish or from observations at close range (from the vessel) and through binoculars (from vessel and plane). The tonnage estimates, made by experienced tuna fishermen aboard the research vessel, were corroborated by the spotter pilot. The resource appeared sufficiently large to support commercial fishing. Several fish schools behaved in a manner that would make them potentially available to commercial fishing by either live-bait or purse-seine methods. Fishing from the research vessels was by the live-bait method.

Sooty terns (*Sterna fuscata*) were seen frequently; frigate birds (*Fregata magnificens*), boobies (*Sula* spp.), noddy terns (*Anous* spp.), and tropic birds (*Phaethon* spp.) also were present. The terns, frigate birds, and boobies often were associated with tuna schools. Sightings of birds and tunas were more numerous on the west than on the east side of St. Vincent and Grenada. During March 11-17, 33 flocks of more than 10 birds each were seen on the west side of the islands, compared to 17 flocks on the east side.

The greater abundance of tunas and birds west of the Lesser Antilles was associated with differences in the biological and physical features of the ocean environment (table).

Physical and Biological Features of the Oceanic Environment on the East and West Sides of the Southern Lesser Antilles Islands, March and April 1966		
Feature	West of Islands	East of Islands
Number of tuna schools observed	14 (3 days)	6 (3 days)
Number of bird flocks ¹ observed	33 (3 days)	17 (3 days)
Depth of mixed layer (meters)	40-100	70-150
Average rate of C-14 uptake (g. C/m. ² /day)	0.048 (4 stations)	0.025 (3 stations)
Average zooplankton displacement volume (ml./1,000 m. ³)	177 (14 stations)	72 (4 stations)
¹ /More than 10 birds.		

The mixed surface layer was shallower on the west side of the island chain than on the east. Primary productivity, measured as the rate of uptake of carbon isotope C-14, was nearly twice as much on the west as it was on the east side; the average displacement volume of zooplankton was about $2\frac{1}{2}$ times higher.

EFFICIENCY OF SEARCH

The distance at which tuna schools or birds associated with tuna schools can be detected visually varies widely. Behavior of the animals, weather conditions, and the observer's experience are critical factors. Under ideal weather conditions, an experienced observer aboard a vessel may detect a school of tuna "breezing" at the surface up to 3 miles away. A bird flock may be seen from 5 miles away.

Visibility of surface-schooling fish is better from a plane than from a ship because the observer is higher; under ideal conditions, fish schools may be seen 5 to 8 miles away. From a plane birds can be seen up to about 1 mile; birds are difficult to see because their dark dorsal surfaces blend with the color of the sea. Birds seen from a vessel are more visible because they are silhouetted against the sky. Unfavorable weather and sea conditions affect visibility from both surface and air, but certain spotting difficulties are less troublesome to spotters in a plane. For instance, from an aircraft fish schools and surface ripples ("wind spots") are easier to tell apart than they are from a vessel.

The areas searched by the plane and ship were compared by assuming an effective visibility limit for each. For ease in computation, this limit was assumed to be that distance beyond which the number of targets detected was equal to the number missed within the limit (U. S. Coast Guard, 1963). In this survey, weather conditions and the state of the sea surface limited visibility to less than maximum distances. The sea was usually choppy (sea state 3-5) and whitecaps were numerous. The visibility limit of fish schools from the ship was approximately 1 mile and of bird flocks approximately 4 miles. From the plane, the scouting distance for fish and bird flocks was estimated conservatively at 1 mile, primarily because of the sea state. All flying was below the elevation of the lowest clouds.

Plane and ship tracks crossed at intervals of about $33\frac{1}{2}$ minutes; in that time, the ship traveled 5.7 miles and the plane 54.1 miles. Under the above assumptions for visibility, the maximum areas effectively searched for fish in each interval were 11.3 square miles (vessel) and 108.2 square miles (plane). The maximum areas searched for birds were 45.4 square miles (vessel) and 108.2 square miles (plane). These values indicate that the plane should have encountered, on the average, about 9.6 times more fish schools and about 2.4 times more bird flocks than the Undaunted. The ship's personnel often located fish schools by first locating bird flocks and then approaching the flocks to determine whether fish schools were present. Under this searching technique, the plane would be expected to encounter only 2.4 times as many schools as the vessel.

The sightings of fish schools from the plane and the vessel were compared for the area from St. Lucia south to Trinidad in March 11-17. In March 26-28, when the plane scouted randomly for fish schools, it was not possible to compare the areas surveyed. In 6 days (March 11-13, 15-17), 8 vessel sightings of pelagic fishes and 19 plane sightings were recorded. In the same period, 24 bird flocks of more than 10 birds and 22 smaller flocks were seen from the Undaunted. Twenty-six bird flocks of more than 10 birds and 49 smaller flocks were sighted from the plane.

The survey indicated that the plane was more effective than the vessel in searching for surface tuna schools. The numbers of fish schools and bird flocks seen from the plane were 1 to $2\frac{1}{2}$ times greater than those seen from the Undaunted. The actual ratio of small flocks of birds seen from the plane, compared to those sighted from the vessel (2:2), was close to the expected ratio (2:4). The ratio for fish schools seen (2:4) was less than the expected ratio (9:6). Much of the time, however, vessel personnel depended on flock sightings to indicate the location of schools of fish under the hovering birds. The ratio for large flocks of birds seen (1:1) suggests that these flocks were visible from the vessel for a greater distance than assumed in the theoretical calculations.

Use of the plane broadened the geographical area that could be searched within a given period. Its use increased the likelihood of sighting concentrations of fish, since tuna schools (and bird flocks) often are aggregated in certain oceanic areas because of favorable environmental conditions.

LITERATURE CITED

BROADHEAD, G. C. and A. R. MARSHALL

1961. New Methods of Purse Seining for Tuna in the Eastern Pacific Ocean. Proceedings of the Gulf and Caribbean Fisheries Institute, 13th Annual Session, November 1960, pp. 67-73.

BROADHEAD, G. C.

1962. Recent Changes in the Efficiency of Vessels Fishing for Yellowfin Tuna in the Eastern Pacific Ocean. Inter-American Tropical Tuna Commission Bulletin, vol. 6, no. 7, pp. 283-332.

IVERSEN, E. S.

1963. Air Support for Fisheries. Sea Frontiers, vol. 92, no. 2 (March-April), pp. 118-123.

MARTY, J. J.

1965. Methods and Organization of Operative and Perspective Fish Scouting Services, pp. 25-34. In: Group fellowship study tour on fisheries biology and oceanography in the Union of Soviet Socialist Republics, 10 August-23 September 1964, Lectures. Report, Food and Agricultural Organization, Expanded Program of Technical Assistance (1937-II), 222 pp.

UNITED STATES COAST GUARD

1963. National Search and Rescue Manual. U.S. Coast Guard Manual CG-308, 1-1 to 8-8, plus Appendices A-F, 1959, Amendment 1, May 31, 1962; Amendment 2, 1963.



SPACECRAFT SURVEYS AID OCEANOGRAPHIC STUDIES

An intensive study of GEMINI photographs taken over a number of oceanic and coastal areas has revealed that they are of significant value to ocean scientists. A scientist of the U. S. Naval Oceanographic Office, Suitland, Md., stated in a recent paper that large-scale oceanographic features observed in outer-space color prints may aid scientists in correcting charts, tracking river effluent, and detecting shoal areas.

Among other possible applications for spacecraft in oceanography are ice surveillance, sea state measurements, and mapping of currents. Radar, infrared, and passive microwave devices would be used in such work.

The scientist said that a few years ago the words "spacecraft" and "oceanography" were incompatible. Today, however, the combination of outer space and inner depths is no longer considered a fantasy. The Naval Oceanographic Office has been working on such a program since October 1965.

A summary shows that oceanographers may have both scientific and economic reasons for turning to spacecraft. Earth-orbiting satellites provide a means of constantly surveying remote areas such as the Arctic, Antarctic and South Pacific. More frequent coverage of the world's oceans could also be obtained and a new global perspective provided. These factors would lead to a better understanding of oceanic phenomena.

The scientist pointed out that two-thirds of a satellite's orbiting time is spent over the ocean. Aircraft flying across large water masses have already proven that valuable scientific data can be gathered remotely.

THE SUBTROPICAL UNDERWATER OF THE EASTERN GULF OF MEXICO

By Reed S. Armstrong*

The R/V "Geronimo," Bureau of Commercial Fisheries, Galveston, Tex., occupied 20 hydrographic stations over the continental slope off the Florida Gulf coast between June 30 and July 13, 1966. One purpose of the cruise was to examine the SUW (Subtropical Underwater), which is characterized by a subsurface salinity maximum. This water enters the Gulf of Mexico through the Yucatan Channel and is the major component of the upper waters over a large portion of the Gulf.

The predominant features in July were the extensive penetration of the SUW into the part of the Gulf surveyed and the presence of an intense core far to the north (figs. 1 and 2). The circulation of the SUW can be deduced from the topography of the salinity maximum layer (fig. 3). In the eastern portion, a flow to the south southeast is indicated. A clockwise curvature prevails in the north producing an area of convergence and a deepening of the water, thereby increasing the persistence of the high-salinity core. Another clockwise curvature is apparent in the southern part of the sampling area.

The circulation in the eastern Gulf of Mexico has by no means been established, but what now seems to be one of the best representations was prepared by Drummond and Austin, 1958^{1/}. They showed a tongue-shaped flow entering the Gulf through the Yucatan Channel, spreading out through all the eastern Gulf, and then exiting through the Florida Straits. Superimposed on this flow was a separate, clockwise-circulating cell in the northeast Gulf--and another clockwise cell off the western tip of Cuba. Presumably, these gyres and those noted from data gathered from the Geronimo are the same. Our information indicates, however, that the area of the northern gyre is at times more restricted.

About a month after the Geronimo cruise, the R/V "Alaminos" (Texas A&M Research Foundation) cruised in the eastern Gulf of

Mexico (August 4-18, 1966). Waters with salinity maximums >36.4 p.p.t. (parts per thousand) were encountered at 43 stations in the eastern Gulf. The water of 36.7-p.p.t. salinity (to the north) was a separate cell and its center was at least 83 km. southwest of its position during the Geronimo cruise (fig. 4). The high-salinity water (>36.6 p.p.t.) in the south (fig. 2) was displaced to the south about 110 km. by the time of the Alaminos cruise.

The circulations deduced from the topography of the salinity-maximum layer (fig. 5) indicate that these waters were associated with clockwise rotating gyres. Also, the depth of the 36.7-p.p.t. salinity water in July (northern gyre) was about 15-25 m. less than the depth at the same location in August. The depth to the 36.6-p.p.t. salinity cell, however, was about the same in July as in August.

The significant question concerns the cause for the change in position of the gyres over the month period. The possible causes are:

1. Varying intensity of flow entering the Yucatan Channel.--This explanation requires a stronger flow into the Gulf during July to produce a greater penetration and greater volume of SUW in the Gulf. The results would be to push the 36.7-p.p.t. water and the northern gyre farther north, and the southern gyre farther northeast in July than in August.

This assumption could explain the southern gyre. In the northern gyre, however, the greater flow would deepen the SUW. It should have been at a deeper level in July than in August, but the opposite occurred.

2. Waters with different salinity characteristics were entering the Gulf in the two periods.--This possibility requires that water of 36.7 p.p.t., or greater, salinity was entering the Gulf before the July cruise and that less saline water was introduced before the August period. Thus, the 36.7-p.p.t. salinity

*Research Oceanographer, BCF Biological Laboratory, Galveston, Texas.

^{1/}Drummond, Kenneth A., and George B. Austin, Jr.: Some aspects of the physical oceanography of the Gulf of Mexico, 1958. U.S. Fish and Wildlife Serv., Spec. Rep. 249, pp. 5-13.

Note: This is Contribution No. 224, BCF Biological Laboratory, Galveston, Tex.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 784

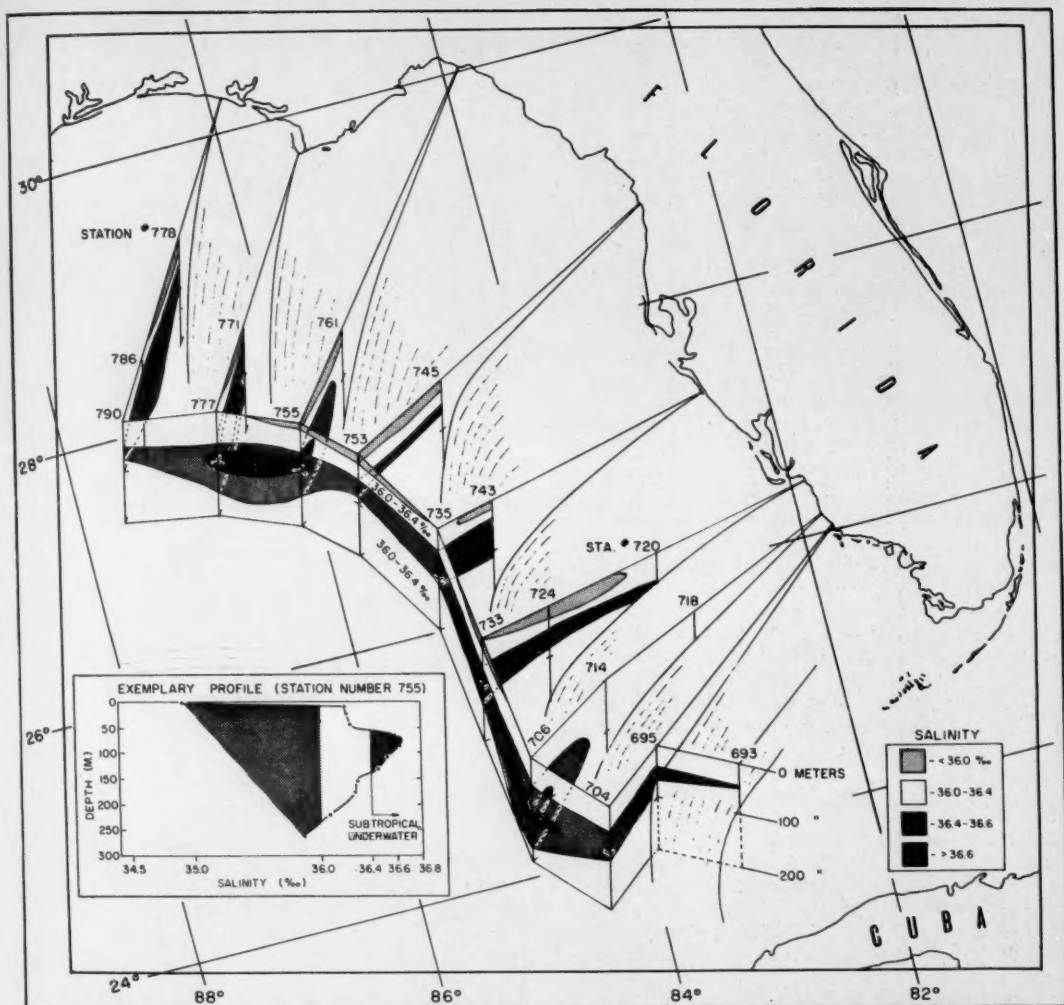


Fig. 1 - Three-dimensional salinity distribution from cruise 9 of the R/V "Geronimo" (June 30-July 13, 1966).

water would have covered a more extensive area in July and would have been "eroded" somewhat by August.

This concept is supported by the presence of low-salinity (<36.6 p.p.t.) water, which apparently entered the Gulf during early August. Water of such varying salinity would probably enter the Gulf as isolated bubbles.

This concept alone does not account for the changes in the circulation that took place in the northeastern part of the Gulf between July and August.

3. Different configuration of the flow pattern.--It is probable that in the oceans the flow pattern at any moment does not necessarily follow the pattern of the mean flow. Rather, both direction and speed of currents vary from time to time. As information continues to collect, such conditions seem to be the more typical state of the system. This explanation, combined with concept (2), can describe the changes encountered in the two cruises.

4. Isolated cells which move about.--This explanation would be a specific form of the variations discussed in (3) above. It is con-

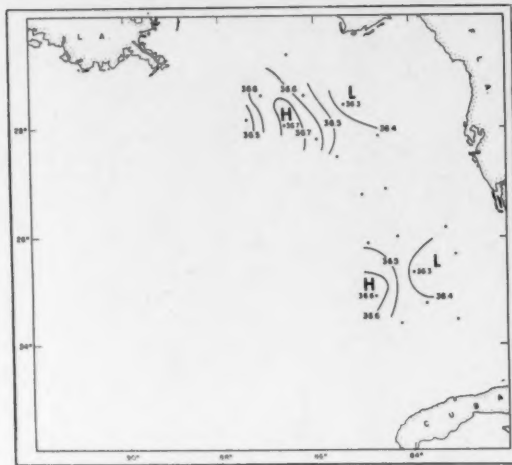


Fig. 2 - Value of salinity maximum in p.p.t. (parts per thousand) Subtropical Underwater from cruise 9 of R/V Geronimo.

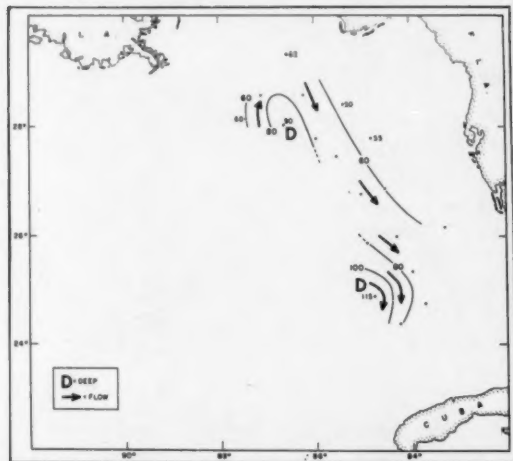


Fig. 3 - Depth to salinity maximum layer in meters (Subtropical Underwater) from cruise 9 of R/V Geronimo.

ceived that the northern clockwise rotating gyre is accelerated northward by the main flow, hits the continental slope, and bounces southward toward the main flow. This possibility also seems to fit the data of the Geronimo and Alaminos cruises--particularly because, as the gyre moves northward, the clockwise motion should decrease and the depth to the salinity maximum in the gyre should also decrease. It is significant that when this gyre is located over the continental slope, the northern portion is over the shelf

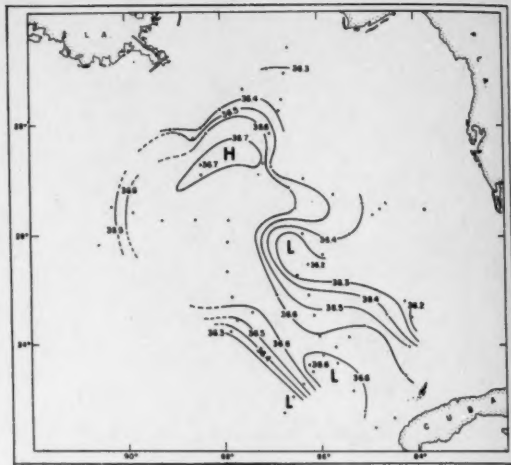


Fig. 4 - Value of salinity maximum in p.p.t. (Subtropical Underwater) from cruise 66 of R/V "Alaminos" (August 4-18, 1966).

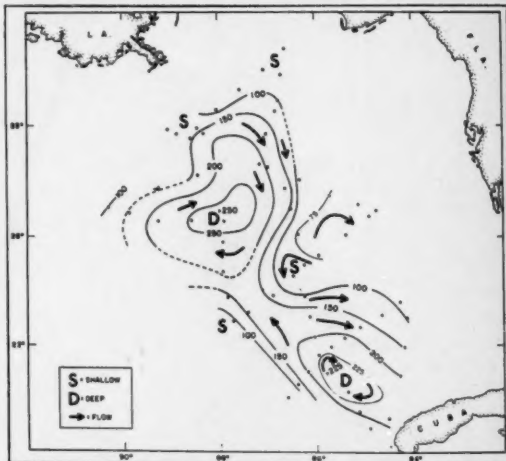


Fig. 5 - Depth to the salinity maximum in meters (Subtropical Underwater) from R/V Alaminos cruise.

and, because of the circulation, this would be an area conducive to upwelling.

It is apparent from these data that flow in the oceans is not in a steady state, but varies considerably in time. The forces producing the currents are changing, and changing at a rate greater than the time required for steady-state motion to develop. The transfer of these forces through the waters can be likened to a pulsating system.

EXPERIMENTAL REARING OF POSTLARVAL BROWN SHRIMP TO MARKETABLE SIZE IN PONDS

By Ray S. Wheeler*

The commercial fishery for several species of penaeid shrimp along the south Atlantic and Gulf of Mexico coasts is the most valuable fishery in the United States. In 1965, fishermen were paid about \$82 million--a value exceeding that of Pacific salmon, the shrimp's nearest rival, by 22 percent.

Landings in the United States consist almost entirely of shrimp taken in nets towed by trawlers on the near-shore fishing grounds. Although similar techniques are used by foreign fishermen, their production is not limited to this method. In India, for instance, culturing of shrimp in ponds has developed to a point where production of whole shrimp amounts to more than 1,000 pounds per acre (Menon, 1954^{1/}).

In the United States, efforts to rear shrimp in ponds to marketable size have been primarily experimental and attempted by only a few organizations. The BCF Biological Laboratory, Galveston, Tex., began studies in 1964 to determine the feasibility of culturing shrimp under seminatural conditions.

In March and May 1965, postlarval brown shrimp (*Penaeus aztecus* Ives) were collected at the entrance of Galveston Bay with fine-mesh nets and stocked in each of 2 shallow $\frac{1}{8}$ -acre, brackish-water ponds built in December 1964.

Two rearing methods were used. In one pond, shrimp were fed a prepared diet, and filtered sea water was pumped through the pond at a rate of 60 gallons per minute. During a 95-day period, shrimp showed continuous growth and attained an average length of 97.4 mm. (about 106 tails per pound); the projected production was 234 pounds per acre.

In the second pond, commercial fertilizer was applied to stimulate plankton growth, and the water was maintained in a static condition. During a 4-month period, shrimp attained an average length of 80.0 mm. (about 200 tails

per pound) and had a projected production of 45 pounds per acre.

Coefficients of condition showed that shrimp held in the circulating-water pond maintained, in general, a good state of relative well-being; those held in the static-water pond could not.

METHODS AND MATERIALS

Each pond is 100 feet by 50 feet by 4.5 feet and positioned so that the long axis is aligned with the prevailing east-west wind to improve water circulation and aeration (fig. 1). In addition, each pond is connected to a lagoon by a 10-inch, concrete-asbestos composition pipeline fitted with a standpipe in the pond to control water level.

Water was supplied to each pond from the adjacent laboratory building with a 2-inch polyethylene pipe. Before entering the pond, however, all water was filtered through crushed oyster shell (fig. 2) to prevent the introduction of predators. Clogging of these shell filters (one for each pond) necessitated frequent changing.

Shrimp were reared by a different method in each pond. In the static-water pond, only small amounts of water were added to compensate for loss through evaporation and seepage. Food was provided by adding fertilizer to promote the growth of plankton. In the circulating-water pond, there was a constant exchange of water, and shrimp were fed a prepared diet.

Young or postlarval brown shrimp (*Penaeus aztecus*), averaging 14 mm. ($\frac{1}{2}$ inch) in total length (tip of the head spine or rostrum to the tip of the tail or telson), were stocked in both ponds. Before stocking, they had been separated by hand from accompanying organisms, counted, and acclimatized to the pond by introducing water slowly (over a 10-minute period) from the respective ponds into the containers holding them. On the basis of an arbitrary

*Fishery Biologist, BCF Biological Laboratory, Galveston, Texas.

^{1/}Menon, M. K.: On the paddy field prawn fishery of Travancore-Cochin and an experiment in prawn culture. 1954. Proc. Inco-Pac. Fish. Council, 5th sess., sec. II: 1-5.

Note: This article is Contribution No. 228, BCF Biological Laboratory, Galveston, Tex.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 785

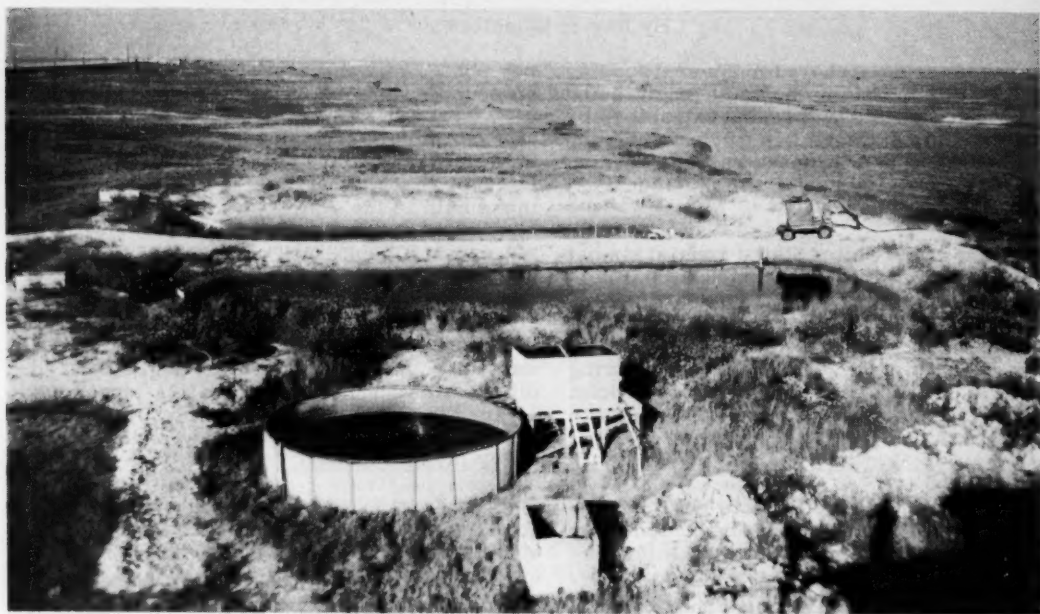


Fig. 1 - $\frac{1}{8}$ -acre ponds used for rearing shrimp.

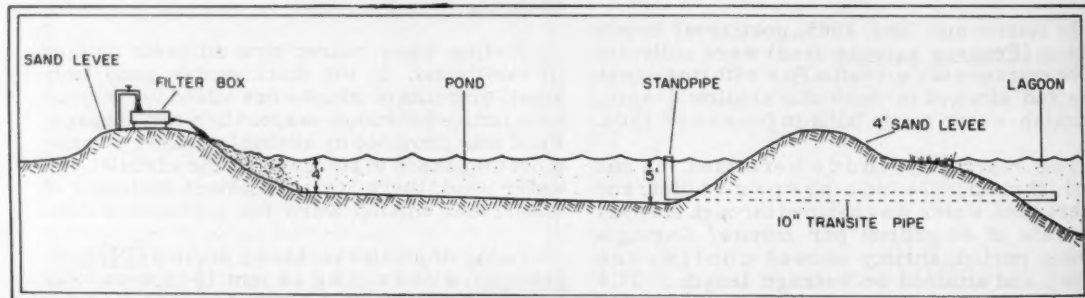


Fig. 2 - Cross section of pond showing location of filter box and standpipe.

estimate of 25-percent survival, and a production goal of 1,000 pounds of whole shrimp per acre, we stocked 9,000 shrimp in each pond. Three weeks after stocking and, weekly thereafter, 40 shrimp from each pond were weighed, measured, and returned to the pond. In the static-water pond, chlorophyll *a* measurements were made periodically from surface-water samples to check the effect of fertilizer on the growth of phytoplankton.

GROWTH AND PRODUCTION

1. The Static-Water Pond

On March 26, 12 days before stocking the postlarvae, the researchers made an initial

application of 160 pounds of soluble inorganic fertilizer with an NPK (nitrogen, phosphorus, potassium) ratio of 3:2:1. An additional 25 pounds of fertilizer (NPK ratio of 4:2:1) were applied on April 9, 2 days after stocking.

Two days after the initial application, a plankton bloom characterized by a slight green coloration was evident. On April 19, the chlorophyll *a* density was 73.0 mg./l. (milligrams per liter), a value 35 times greater than that in the adjacent lagoon. The water was pea green and a mat of algae had formed on the bottom along the pond's edge.

By April 21, the green color of the water began to fade. Fertilizer was added to restimulate plankton growth--but failed. The bloom disappeared by April 23, leaving the water clear and the bottom lined with a heavy deposit of black organic matter that had the distinctive odor of hydrogen sulfide. All postlarval shrimp had died. However, later tests in which shrimp were held in aquaria with similar concentrations of fertilizer indicated that the fertilizer had not caused the shrimp mortality.

On May 3, the pond was emptied, flushed, and refilled. Residual fertilizer^{2/} in the bottom sediments was sufficient to produce an algal bloom in which the chlorophyll a content ranged from 2.3 to 6.4 mg./l.--values about twice that in the adjacent lagoon.

About 6,500 postlarval shrimp were stocked in this pond on May 6 and held 4 months. Shrimp growth during this period is shown in figure 3.

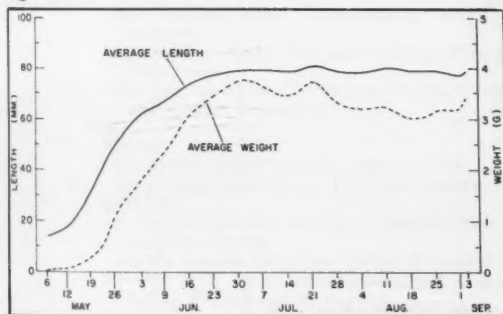


Fig. 3 - Shrimp growth, expressed as average lengths and weights, in the static-water pond over a 4-month period.

In 55 days, shrimp attained an average length of 79.7 mm. (3.1 inches) and average weight of 3.7 grams (0.130 ounce), or about 120 whole shrimp per pound. Average growth rates per day were 1.2 mm. (0.05 inch) in length and 0.7 gram (0.002 ounce) in weight. However, from the beginning of the 3rd month, and for 7 weeks, shrimp exhibited no appreciable increase in length, and showed a statistically significant loss in weight.

When the study was terminated in September, 5.6 pounds of whole shrimp having a tail count of about 200 per pound were removed from the pond. Projection of this value gives an estimated yield of about 45 pounds per acre.

^{2/}Four days after refilling, a chemical analysis of water samples from the pond and the lagoon showed the total phosphate content to be 8.20 and 2.85 µg. at./l. (microgram atoms per liter), respectively.

2. The Circulating-Water Pond

Water was circulated at a rate of 60 gallons per minute (an amount equal to about one complete exchange of water every 48 hours); the shrimp were fed daily a prepared diet of ground fish and shellfish (64 percent by weight) mixed with commercially produced livestock food (36 percent by weight). Results are shown in figure 4.

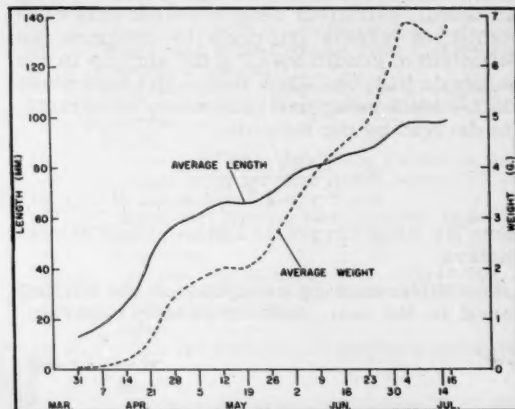


Fig. 4 - Shrimp growth, expressed in average lengths and weights, in the circulating-water pond over a 3-month period.

In 3 months, shrimp grew to an average length of 97.4 mm. (3.8 inches) and weight of 6.9 grams (0.243 ounce), or about 66 whole shrimp per pound. Although weekly growth rates varied, daily increases during this time averaged 0.9 mm. (0.04 inch) in length and 0.073 grams (<0.003 ounce) in weight.

This study was unexpectedly terminated 95 days from the date of stocking. On July 4, shrimp were observed concentrating near the source of inflowing water and crawling out on the banks of the pond. Suspecting low dissolved oxygen, attempts were made to increase water circulation (and thus oxygen) by pumping in more water with a 4-inch pump and agitating the pond water with an outboard motor. The attempts proved only partially successful, however, for when the pond was drained on July 16, only 231 shrimp remained.

After the July 4 kill, 25.7 pounds of dead shrimp (1,696 shrimp averaging 97.4 mm. in length and having a tail count of about 106 per pound) were removed from the pond banks and

water's edge. All dead shrimp were not recovered, however, because the pond was not immediately drained. Projection of the combined weights of dead and surviving shrimp showed a yield of 234 pounds of whole shrimp per acre in a 95-day growing period.

CONDITION OF SHRIMP IN THE TWO PONDS

Although the initial attempts to rear shrimp under semi-natural conditions were not fully successful, sufficient length-weight data were obtained at weekly intervals to compare the coefficient of condition (K) of the shrimp in the two ponds (fig. 5). This factor (K) expresses relative well-being and robustness of shrimp; it is derived by the formula:

$$K = \frac{1,000,000 W}{L^3}$$

where W = weight in grams and L = length in millimeters.

The difference in condition of the shrimp reared in the two ponds is readily apparent.

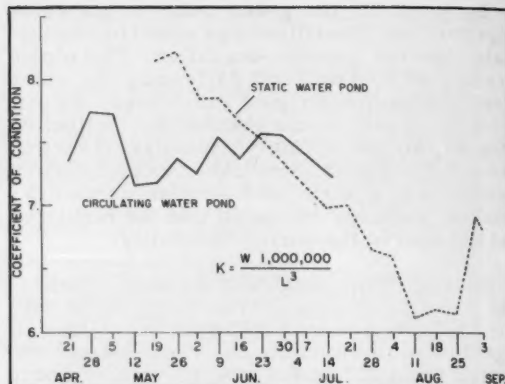


Fig. 5 - Weekly variations in the relative well-being and robustness of shrimp reared in the static- and circulating-water ponds.

Shrimp held in the circulating pond maintained, in general, a good state of relative well-being, whereas those held in the static-water pond did not.



Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.



INDEX

- | | |
|--|--|
| <p>Page</p> <p>UNITED STATES:</p> <p>Events and Trends:</p> <p>1 .. New England Fleet Sets Outstanding Safety Record in 1966</p> <p>1 .. Oil Is Another Worry for New England Fishermen</p> <p>2 .. Industry Plans to Develop Unused Gulf Fish</p> <p>2 .. Menhaden Industry Tests Gulf's Bottomfish Potential</p> <p>2 .. Fish Meal Futures Trading Begins on N. Y. Produce Exchange</p> <p>2 .. Fishing Vessels Are Required to Use Proper Sound Producers</p> <p>3 .. First U. S. Fisheries Exposition Aims To Aid Industry</p> <p>3 .. 1966 Imports of Frozen Fish Blocks Declined 3%</p> <p>3 .. Menhaden Catch Dropped in 1966</p> <p>3 .. Pacific Coast Canned Salmon Stocks Are About A Third Above 1966</p> <p>4 .. Shrimp Imports Rose 10% in 1966</p> <p>4 .. January 1967 Wholesale Prices and Indexes for Edibles</p> <p>Oceanography:</p> <p>5 .. Aluminaut Conducts Undersea Surveys Off Florida</p> <p>5 .. Navy Studies Ways of Recovering Testing Devices</p> <p>6 .. Round-The-World Magnetic Survey Flight Underway</p> <p>6 .. Navigational Field Survey of Pacific Coast and Hawaii Scheduled</p> <p>States:</p> <p>Alaska:</p> <p>7 .. Governor Urges Fishing Gear Limits</p> <p>7 .. King Crab Landings in 1966 Set Record</p> <p>Michigan:</p> <p>7 .. Seeks To Balance Fishing Demands With Limited Stocks</p> <p>7 .. Builds Vessel for Great Lakes Research</p> <p>Mississippi:</p> <p>8 .. Catfish Production Increases</p> <p>Texas:</p> <p>8 .. Shrimp Threatened by Destruction of Estuaries</p> <p>Bureau of Commercial Fisheries Programs:</p> <p>9 .. Invertebrates in New England Marine Waters May Have Value</p> <p>9 .. Seattle Lab Studies Gray Whales</p> <p>9 .. BCF's "Undaunted" Cooperates in Fishery Research</p> <p>9 .. "Oregon II" is Christened</p> <p>10 .. "Oregon" Reports Red Snappers Off Honduras</p> <p>10 .. BCF and Navy Conduct Oceanographic Explorations</p> <p>10 .. Trade Fairs Sell Calico Scallops</p> <p>10 .. U. S. Fishery Products To Be Shown in Frankfurt</p> <p>Federal Actions:</p> <p>Atomic Energy Commission:</p> <p>11 .. Advances Food Irradiation Program</p> <p>Food and Drug Administration:</p> <p>11 .. Canned Tuna Now Includes Blackfin</p> <p>Economic Development Administration:</p> <p>11 .. Funds Assure Pacific Hake Fishery</p> <p>11 .. Project Could Aid Coastal Clam Flats</p> <p>11 .. Study of Fish Reduction Process Approved</p> <p>INTERNATIONAL:</p> <p>12 .. U. S. and USSR Agree on Fishing Pact</p> | <p>Page</p> <p>INTERNATIONAL (Contd.):</p> <p>International Pacific Halibut Commission:</p> <p>12 .. Proposes 1967 Halibut Regulations</p> <p>International Northwest Pacific Fisheries Commission:</p> <p>13 .. Japan-Soviet Talks Start March 1</p> <p>Law of the Sea:</p> <p>14 .. Brazil May Ratify 1958 Conventions</p> <p>14 .. Norway May Keep Some Fishing Rights in Greenland</p> <p>Marine Oils:</p> <p>14 .. Decline in 1967 World Production Forecast</p> <p>15 .. Norway and USSR Continue Joint Fishery Research Projects</p> <p>15 .. Joint Expedition Planned by Brazil and Norway</p> <p>15 .. USSR Plans 1968 International Fisheries Fair</p> <p>FOREIGN:</p> <p>Canada:</p> <p>16 .. "Canadian Fisherman" Sees Collective Responsibility for High Boat Losses</p> <p>16 .. Sets Limit on Lobster Traps</p> <p>17 .. East Coast Herring Meal Industry Expands</p> <p>Latin America:</p> <p>Argentina:</p> <p>18 .. Adopts 200-Mile Maritime Jurisdiction</p> <p>18 .. Soviets Protest Argentina's 200-Mile Maritime Jurisdiction</p> <p>Cuba:</p> <p>19 .. Will Not Recognize Argentina's 200-Mile Waters</p> <p>Mexico:</p> <p>19 .. Extends Fisheries Jurisdiction To 12 Miles</p> <p>19 .. Firm Makes Shipboard Fish Meal Plants</p> <p>Chile:</p> <p>19 .. Fish Meal and Oil Production Is Up</p> <p>Ecuador:</p> <p>20 .. Fishing Industry Grows</p> <p>20 .. Issues Temporary Fishing License</p> <p>Venezuela:</p> <p>21 .. Whole Sardines May Not Be Used for Fish Meal</p> <p>Brazil:</p> <p>22 .. Soviets Seek Brazilian Market</p> <p>Peru:</p> <p>22 .. Report on Fish Meal Industry</p> <p>Europe:</p> <p>USSR:</p> <p>24 .. Average Pacific Ocean Perch Catch Is Smaller</p> <p>24 .. Antarctic Whaling Fleet Is Smaller</p> <p>24 .. Amur River Salmon Ran Late in 1966</p> <p>24 .. Sakhalin Looks Ahead 15 Years</p> <p>24 .. Japanese Technicians Observe Soviet North Atlantic Operations</p> <p>25 .. Team Observes Japanese Tuna Fishing</p> <p>25 .. Canadians and Others Study Training of Recruits</p> <p>Denmark:</p> <p>25 .. Government Bank Loans Rose in Fiscal Year 1965-66</p> <p>26 .. Solvent Process Can Produce High-Quality Fish Meal</p> <p>26 .. Requires Date Marking of Preserved Fish</p> <p>Iceland:</p> <p>26 .. Fisheries Catch Set Record</p> <p>27 .. Groundfish Industry Faces Problems</p> <p>Norway:</p> <p>27 .. 1966 Landings and Exports Hit Record</p> <p>27 .. Scientists Predict Decline in Cod Stocks</p> |
|--|--|

Index continued page 54.

INDEX (CONTINUED)

Page		Page	
	FOREIGN (Contd.):		FOREIGN (Contd.):
	Europe (Contd.):		Asia (Contd.):
	West Germany:		Japan (Contd.):
27 ..	To Expand Fishing Off South-West Africa	33 ..	1966 Landings at Yaizu Reached All-Time High in Value
	Ireland:	33 ..	Bait Saury Prices Up
27 ..	Aims To Double Fisheries Earnings By 1970	33 ..	Herring Roe Prices Skyrocket
	Poland:	33 ..	To Buy More Shrimp From Pakistan
28 ..	To Export Canned Lampreys	34 ..	Sends Survey Team To Peru and Mexico
	Greece:	34 ..	Helps Develop Fisheries in Peru and Ecuador
28 ..	Frozen Fish Landings Increased in 1966	34 ..	Second Firm Explores for Shrimp Off Northern Australia
	Italy:	34 ..	Japan-U. S. Fishery Venture Planned in Alaska
28 ..	EEC Approves 30,000-Ton Duty-Free Tuna Import Quota		Taiwan:
	Asia:	35 ..	Plans To Expand Tuna Fishery
	Japan:		Republic of Korea:
29 ..	Purse-Seine Tuna Fishery Gains Attention	35 ..	Selects Priorities for Next 5 Years
29 ..	Tuna Purse Seining Off Northwest Africa Improves		Philippines:
29 ..	Tuna Fleet Based in American Samoa Is Reduced	35 ..	To Expand Fishpond Industry
29 ..	Scientist Suggests Artificial Propagation of Tuna		Australia:
30 ..	Adopts 80,000-Ton Frozen Tuna Quota to U. S.-Canada	36 ..	Tasmania Limits Spiny Lobster Fishing Licenses
30 ..	Frozen Tuna Export Quotas Set for BY 1967		New Zealand:
30 ..	Frozen Tuna Export Prices Weaken	36 ..	Fish Meal Plants Planned
30 ..	Frozen Tuna Export Validations Rose in 1966		New Guinea:
31 ..	Boat-Carrying Tuna Mothership To Fish in Indian Ocean	36 ..	Japanese-Australian Firm To Fish Shrimp
31 ..	Tuna Catches Are Declining in Atlantic and Indian Oceans		Africa:
31 ..	Adopt 1967 Export Quotas for Swordfish and Tuna Loins		South Africa:
31 ..	Vessel Owners To Hire Okinawans	37 ..	Pelagic Fish Catch Dropped in 1966
31 ..	Antarctic Whale Catch Nears Third of Quota		Ivory Coast:
31 ..	Atlantic Trawl Fishery Is Good	37 ..	Fish Catch Dropped in 1966
32 ..	Owners of Seized Vessels Want Tokyo To Repay Fines		Mauritania:
32 ..	Mackerel Fishermen Fight Over Type of Gear	37 ..	Seizes Japanese Trawler
32 ..	Firm Will Build Two 4,000-Ton Stern Trawlers		Nigeria:
32 ..	Fishermen Seek To Long Line in Gulf of Alaska	37 ..	Claims 12-Mile Territorial Waters
32 ..	Produces Fish Blocks for U. S.		Senegal:
33 ..	Fish Meal Production By New Plant is 1,000 Tons	38 ..	Soviets Supply Tuna Vessels
		38 ..	Foreign Fishing Off U. S. Coasts, January 1967
			ARTICLES:
		41 ..	An Aircraft and Vessel Survey of Surface Tuna Schools in the Lesser Antilles, by Albert C. Jones and Paul N. Sund
		46 ..	The Subtropical Underwater of the Eastern Gulf of Mexico, by Reed S. Armstrong
		49 ..	Experimental Rearing of Postlarval Brown Shrimp to Marketable Size in Ponds, by Ray S. Wheeler
		57 ..	FDA Requirements for Fish Protein Concentrate (FPC)



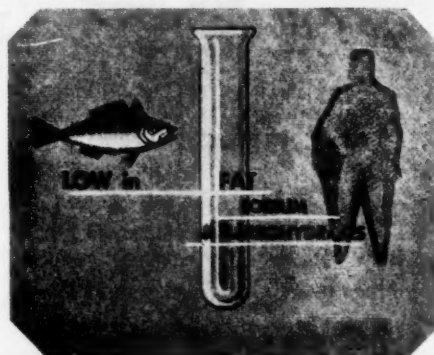
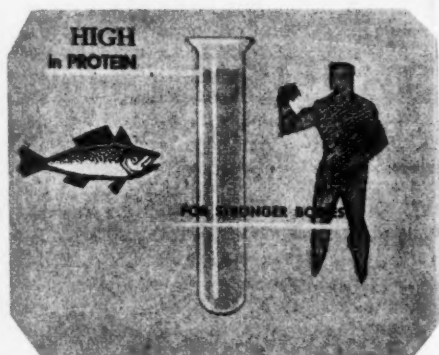
FISH NUTRITION

Here is a well rounded story on the nutritive qualities of fish.

The average American eats only about 10 pounds of fish a year, according to the U. S. Bureau of Commercial Fisheries. Japanese and the Scandinavians eat four times as much. Only about 50 percent of all the fish caught in the United States is used for food.

Nutritionally speaking, fish have much in their favor:

1. Most fish are 18-20 percent protein, about the same as meat and the protein is of a very high quality.
2. Most varieties are low in fat--less than 1 percent--thus being moderately low in calories. Fish such as cod, haddock, ocean perch, flounder, and sole supply only about 80 calories (1 gram of fat and 18 grams of protein) for every 3- to 3½-ounce serving.
3. The varieties with more fat in them have an important characteristic. Fish oil is a highly unsaturated oil and compares favorably with some vegetable oils in its ability, under certain conditions, to lower the level of cholesterol in the blood. Moderately fat fish (2-5 percent), such as trout, pickerel, catfish, bluefish, halibut, swordfish, supply about 125 calories per serving. The so-called high fat fish (8-15 percent) are still fairly modest in calories. Mackerel, salmon, sardines, pompano, herring, average from 180 to 200 calories for each serving. These "fat" fish also have a considerable amount of vitamin A.



4. Shellfish--oysters and clams in particular--are good sources of iron.
5. Fish with soft bones which you can eat such as sardines and canned salmon are high in calcium and fluorine, the tooth decay-preventing mineral nutrient.

In spite of all these attributes, as a nation, we aren't much interested in fish. The chief problems seem to be:

1. Many people think fish must be fresh to be enjoyed. Better freezing methods are making it possible for the Middle West in particular to have a steady supply of high-quality fish.
2. Fish has been designated in most minds as "Friday" food.
3. Unless fish is prepared with care and imagination, it can be pretty dull stuff. The flavor is monotonous. But fish prepared with a judicious use of herbs and a gentle touch is a real gourmet delight.

Fish makes nutritional sense. And economy is a factor; many types of fish will fit almost any budget.



UNITED STATES DEPARTMENT OF THE INTERIOR
STEWART L. UDALL, SECRETARY

STANLEY A. CAIN, ASSISTANT SECRETARY,
FISH AND WILDLIFE AND PARKS

CLARENCE F. PAUTZKE, COMMISSIONER,
FISH AND WILDLIFE SERVICE

HAROLD E. CROWTHER, ACTING DIRECTOR
BUREAU OF COMMERCIAL FISHERIES

FDA REQUIREMENTS FOR FISH PROTEIN CONCENTRATE (FPC)

In approving "whole fish protein concentrate" as a food supplement (additive) on February 2, 1967, the Food and Drug Administration specified that the following "prescribed conditions" be met:

1. The FPC is made from "whole, wholesome hake and hake-like species handled expeditiously and under sanitary conditions. . . ."

2. It "consists essentially of a dried fish protein processed from whole fish. . . . It is prepared by solvent extraction of fat and moisture with isopropyl alcohol or with ethylene dichloride followed by isopropyl alcohol; solvent residues are reduced by conventional heat drying and/or microwave radiation; and there is a partial removal of bone."

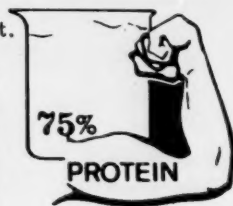
3. FPC meets these specifications:

- Protein content is not less than 75 percent by weight of final product.

- Moisture content is not over 10 percent by weight.

- Fat content is not above 0.5 percent by weight.

- "The additive may contain residues of isopropyl alcohol and ethylene dichloride not in excess of 250 parts per million and 5 parts per million, respectively, when used as solvents in the extraction process."



- Microwave radiation not over 25 kilowatts in power "may be used to reduce residues of the solvents used in the extraction process." The frequency of the electronic equipment used must be approved by the Federal Communications Commission.

- The FPC shall not have more than 100 parts of fluorides in a million parts of FPC.

- The FPC shall be free of disease-carrying organisms or viruses.

- It shall have "no more than a faint characteristic fish odor and taste."



4. It is used "only in the household as a protein supplement in food." Children under 8 years who consume FPC regularly should not consume over 20 grams per day. (Twenty grams produce a heaping tablespoon.)



5. The FPC "is packaged in consumer-sized unit not exceeding 1 pound net weight."



6. The label shall bear the name of "whole fish protein concentrate," and adequate, readily understood directions that comply with limitations in No. 4 above.



FPC

FISH PROTEIN CONCENTRATE

This inexpensively produced food supplement, high in animal protein, has been developed through the concerted efforts of scientists and industrial men of many nations working to alleviate the malnutrition of millions of the world's peoples.

The many qualities of FPC give rise to many uses. It can be produced in the form of a tasteless, odorless flour, or as a soluble powder in a wide variety of flavors.

In addition to its major value as a dietary supplement for the alleviation of malnutrition, FPC could be utilized advantageously for military, civilian defense, and space rations, where compactness is essential.

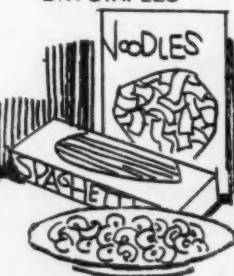
The potential for existing and new markets and industries is very promising. The U.S. fishing industry will welcome the stimulus provided by the introduction of FPC manufacture and begin to exploit many untapped resources such as, for example, the HAKE, a fish which abounds in our coastal waters.

Shipbuilding, distribution, packaging, and many other industries will also greatly benefit by the development of . . .

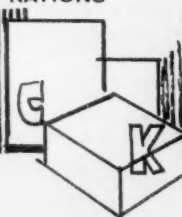
BREADS



DRY STAPLES



RATIONS



SOUPS



FPC

